JANUARY 15, 1915
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EASTERN BUYERS' INFORMATION NUMBER

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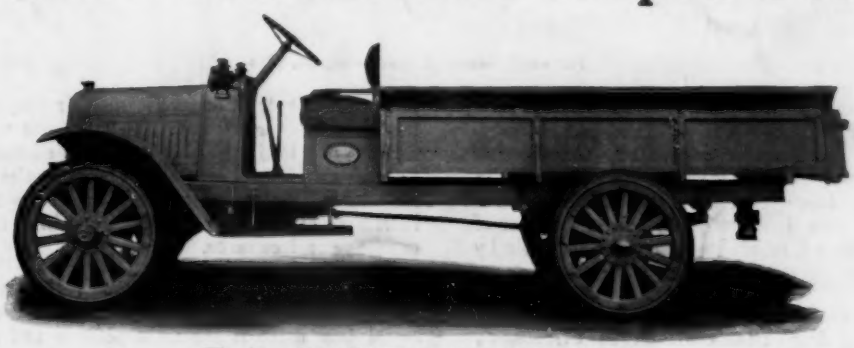
THE COMMERCIAL CAR JOURNAL

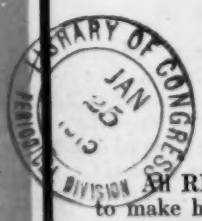
Entered as Second-Class Matter at the Post Office at Philadelphia, Pa.

REPUBLIC FOR SERVICE
REPUBLIC MOTOR TRUCK CO.
ALMA, MICH.

Republic Trucks Are Rapid Sellers



The New Republic Three-Quarter Ton Model
Featuring an internal gear drive rear axle. Furnished complete, as above, $995



All REPUBLIC dealers know this to be the truth. So do their competitors, for they find it hard to make headway against REPUBLIC prestige, REPUBLIC value, and REPUBLIC performance.

The reason for REPUBLIC supremacy is not a mystery. It is an honest truck at an honest price. It is a quality truck having the best individual units obtainable, the right design, unsurpassed efficiency, proved economy, and unquestioned durability. It sells because it is the capacity with the right price to give owners the best results.

Three Capacities - - - Five Chasses

MODEL F	MODEL C	MODEL L	MODEL M	MODEL D
1500-lbs. capacity	2000-lbs. capacity	2000-lbs. capacity	3000-lbs. capacity	3000-lbs. capacity
124 in. wheelbase	124 in. wheelbase	144 in. wheelbase	124 in. wheelbase	144 in. wheelbase
35 x 3 front tires	35 x 3 front tires	35 x 3 front tires	35 x 3½ front tires	35 x 3½ front tires
35 x 3½ rear tires	35 x 4 rear tires	35 x 4 rear tires	35 x 5 rear tires	35 x 5 rear tires
$995 (Express Body)	$1350 (Chassis)	$1350 (Chassis)	$1475 (Chassis)	$1475 (Chassis)

The Recognized Standard in Motor Trucks of This Capacity

We desire high-class connections in all unoccupied territory

Republic Motor Truck Company
Alma, Michigan

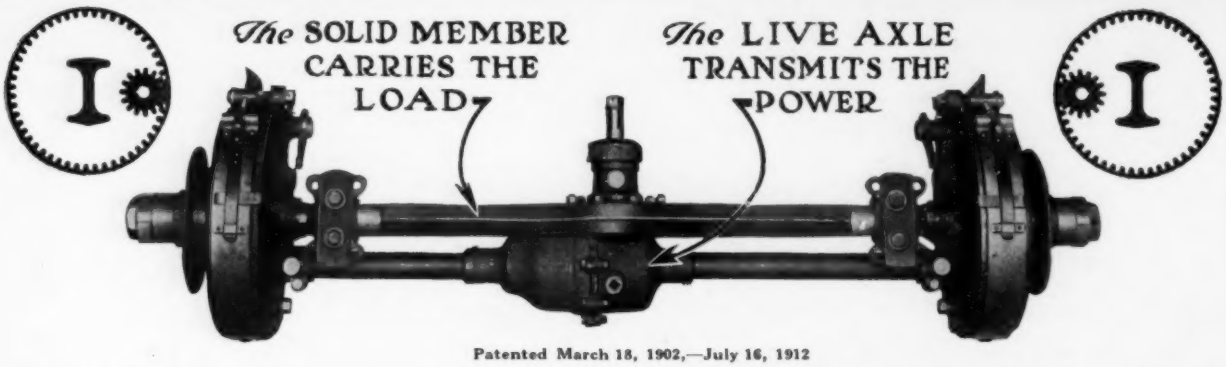
PUBLISHED THE 15TH OF EACH MONTH

CHILTON COMPANY

MARKET & 49TH STS. PHILADELPHIA

TORBENSEN

INTERNAL GEAR DRIVE AXLES



Patented March 18, 1902,—July 16, 1912

An advance over all previous types. The principle of this axle is to supply one solid member for carrying the load and a separate one for transmitting the power to the wheel. The carrying member is of drop forged steel with the wheels running on taper roller bearings. The jack shaft, or power transmitting axle, is securely attached to the rear of this forging, and this unit is relieved of all carrying strain by the forged member, leaving the jack shaft purely for the purpose of propulsion.

All of the driving mechanism is enclosed, affording perfect cleanliness, quiet working and efficient lubrication. The internal gear axle has all the advantages of the usual shaft, as well as those of the chain driven type, and the defects of both are eliminated. Simplicity and ease of assembling are salient features.

In the usual form of shaft-driven axle, including the worm type, the tubular housing is depended upon to carry the load, as well as to support the driving axle. This is the best construction for pleasure car purposes, but for trucks the only satisfactory construction is one where a solid axle supports the load. This is especially essential where solid or cushion tires are used. Chain-driven axles supply the solid support, but the chain requires constant attention, cannot be lubricated and accumulates dirt, resulting in rapid wear and expensive replacements.

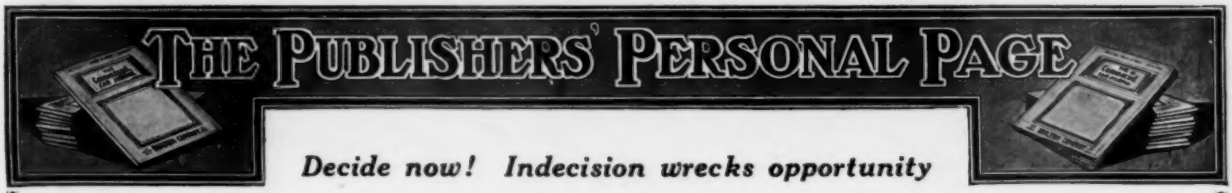
Why not get in line with the march of progress? The Torbensen type is the axle of the future. The internal gear drive is the most positive and economical of all methods of power transmission. Truck users no longer have patience with the old wasteful methods. The demand of the hour is for economy and efficiency. Torbensen Internal Gear Drive Axles will bring your truck into the front rank and keep it there.

We have a special proposition for you, Mr. Truck Manufacturer. Write now for complete details and catalogue.

Torbensen Gear and Axle Company

216 to 224 High Street **NEWARK, N. J.**

MAKERS OF INTERNAL GEAR TRUCK AXLES EXCLUSIVELY



Decide now! Indecision wrecks opportunity

At the Crossroads

The truck industry is now at the turning point. Whether it goes into high gear ahead or the reverse depends upon the makers. The depression period has been safely passed, and the crossroads have been reached. One is the road of doubt and unpreparedness, and the other bears the sign, "Production and progress." Which will the makers choose?

Design Changes Show Progressiveness

Changes in design for 1915 are marked, indicating progressiveness. This is shown by the more general adoption of worm, internal gear, and other enclosed drives; increased use of steel wheels; motor under the hood tendency; increase in the number of small cars; more substantial construction, at a lower price; starting and lighting on delivery vehicles; lighter weight, and greater refinement.

Over-Sea Demand

Foreign demand will continue if the goods are right and over-sea agencies are established. The danger is that makers will be content with long-distance order-taking without establishing permanent connections, which will curtail post-bellum European business. Now is the tide, "which, taken at the flood, leads on to fortune"; neglected, your foreign business is ruined. Now is the time to obtain representatives in foreign countries.

Parts Makers Be Ready!

The home demand, now that trucks in small as well as large sizes for every conceivable line of business are being supplied, will increase. Parts makers are you ready? Your production limits that of the complete car makers.

The Right Road

With money in the bank, no cars carried over, new and better models coming through, and general business conditions improving, there should be no hesitation in taking the road of production and progress.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

The Autocar

"Used in Every Line of Business"

A Business Builder for Florists

ABILITY to cover wide delivery territory quickly means much to the florist's business. The *Autocar*, running 50 to 100 miles daily, doing the work of 4 to 6 horses, at a *lower operating cost* than horse equipment, has proved itself the ideal florist's delivery vehicle.

Penn, The Florist, 37-43 Bromfield St., Boston, says, under date of October 10, 1914: "You will be interested in knowing that we expect to order a third *Autocar* in the near future.

"We have operated our two *Autocars* for more than two years with the most satisfactory results. They have given us no trouble to speak of and their value to our business has gone beyond our expectations. For general delivery purposes, they have been most practical and economical."

Max Schling, New York

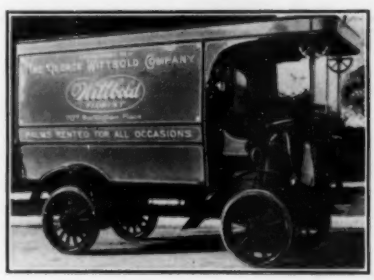
H. H. Battles, Philadelphia

The *Autocar* is the product of seventeen years' concentration on the manufacture of one model of motor delivery vehicle. It has been adopted by 1800 concerns, many of whom own from 10 to 270 cars each.

Hoffman, Boston

Chassis Price $1850

Why not become fully informed on the *Autocar's* value for delivery purposes? Write for our new catalog. It will show you the way to lower delivery costs and improved delivery service. Address Dept. J.



George Wittbold, Chicago

THE AUTOCAR COMPANY, ARDMORE, PA.

Established 1897 **Motor Delivery Car Specialists**

The Commercial Car Journal

VOLUME VIII | PHILADELPHIA, JANUARY 15, 1915 | NUMBER 5

CANADIAN GOVERNMENT BUYS AMERICAN TRUCKS

The Canadian Government has ordered 150 American-made motor trucks, valued at about $400,000, for use with the Canadian contingent abroad. The order is equally divided between the White Company, the Kelly-Springfield Motor Truck Company and the Packard Motor Truck Company. A condition of the contract is that the companies must assemble their parts in Canada, and that the work must be commenced immediately. The militia department has been authorized to purchase additional motor vehicles for ambulance work and for use of officers and the general staff. It is expected that the total amount will exceed $900,000 when these vehicles are purchased.

TRUCK MAKERS AT THE AUTOMOBILE SHOW

In spite of the fact that there were no trucks exhibited at the National Automobile Show in New York City, many of the prominent makers of commercial cars were present, and some of them at least made use of the commercial section provided for them.

A new feature of the show was the reservation of a section on the third floor, among the car and accessory displays, where desks were provided for the truck makers, and an opportunity given them to meet dealers and agents from various parts of the country. It was noticeable, however that the place was very nearly empty a large part of the time, although some truck business was reported as a result.

Those having representation were the Buffalo Electric, Atterbury, Autocar, Dart, Chase, G. M. C., B. A. Gramm, Denby, Federal, General Vehicle, Knox, Kelly-Springfield, Hurlburt, Modern, Mais, Mack, Lippard-Stewart, Speedwell, Republic, Selden, Signal Service, Walker, Walter, Sternberg, and Stewart.

PROTEST AGAINST RUBBER EMBARGO

The Rubber Club of America has protested to the State Department at Washington on account of the drastic action on the part of Great Britain in declaring an embargo on the exportation of crude rubber from that country and her colonies, which will mean a cutting off of 50 per cent. or more of the normal supplies of the crude material required by the industry in the United States. If England does not consent to at least a partial removal of this embargo, it will mean that many of the rubber manufacturing plants will have to shut down, and that a substantial increase in the price of rubber goods will go into effect.

Table of Contents

	PAGE
Advertisers' Index	115
Autocar Searchlight Designed for War Use	48
Accessories and Appliances	41, 55
Buyers' Reference Review	17
Chicago Department Stores Extensive Truck Users—By Walter Bermingham	59
Conventions of Interest to the Trade	6
Dealers *vs.* Branch Houses in Kansas City By W. D. Meng	66
Design and Construction Made Plain —By C. T. Schaefer	43
Editorials	9, 10
Federal Worm Drive	46
Foreign News—From Across the Water	49
Gramms', B. A., Worm-Drive Trucks	47
M. T. A. of Philadelphia Activities	56
New Incorporations	6
Personal Items	5, 6
S. A. E. Midwinter Meeting	8
Trailers, Use of, Increasing—By E. S. Foljambe	11
Trend of Commercial Car Design for 1915 —By J. Howard Pile	37
Trucks Create Great Business	36c
Trucks on the Steep Trails of Sierra and Coast Ranges—By Frank Reed	61
Truck Situation in Kansas City —By J. E. Foland	39
War Notes	49

PROTEST AGAINST MIRROR REGULATION

T. J. Pratt, president of the Motor Truck Club of America, and several of his associates who own motor trucks in New Jersey, have protested against the proposed legislation of Commissioner of Roads, J. H. Lippincott, which requires all trucks operated in New Jersey to be equipped with mirrors to enable the driver to see the road in the rear. The protest states that there are no suitable mirrors now on the market which will withstand the vibration on solid-tired vehicles, and that it discriminates against trucks inasmuch as a similar regulation will not be enforced on horse-drawn vehicles. The protest, up to the present time, has had no effect upon the proposed law.

AN IMPOSTOR

The trade is hereby warned that a young man representing himself to be the son of D. J. Post is endeavoring to obtain sums of money.

FEDERAL MOTOR TRUCK COMPANY SHARES PROFITS

The Federal Motor Truck Company, of Detroit, gave everyone on its payroll a check equal to 10 per cent. of the year's salary as a Christmas gift, this amount being given them as their share in the company's profits.

On the afternoon of December 24th, Mr. M. L. Pulcher, vice-president and general manager, gave the men a short talk in the factory, announcing the results of the Federal's profit sharing plan and making a unique appeal for earnest co-operation of all the shops and departments during the coming year. He stated in his address that it would depend entirely upon the men whether there would be any bonus handed out for 1915 and whether or not the percentage would be greater. Men who were laid off during the year through no fault of their own or through no inability to do proper work were included in the share of the profits. The amount given out was over $10,000.

A little banquet was given in the general offices for the office force, and, with the toys and good cheer handed out in addition to the 10 per cent. bonus, it was a very happy gathering.

N. A. A. C. ASKS SPRING MANUFACTURERS TO DISCOURAGE OVERLOADING

The Commercial Vehicle Committee of the N. A. A. C. has asked the manufacturers of leaf and supplementary springs to co-operate with the Chamber in its efforts to discourage the overloading of trucks. Many truck owners and dealers have requested the spring makers to increase the capacity of the rear spring suspension of trucks so that they can carry loads greatly in excess of the rated capacity of the chassis. A circular letter has been sent out to spring makers by the Chamber stating that such practice was deprecated by the N. A. A. C. Already a number of spring makers have agreed to notify the truck manufacturers of any orders received from dealers or owners to increase spring capacity and to decline to fill such orders without their consent.

NEW MOTOR TRUCK CLUB FOR NEW JERSEY

Motor Truck Club of New Jersey has been formed with headquarters in Newark. It is the purpose of the organizers to hold regular meetings, when addresses of interest to truck owners will be presented. The new organization will seek affiliation with the Motor Truck Club of America. John F. Winchester, of the Standard Oil Company, of New Jersey, has been appointed temporary president, and L. J. McCracken, of the Newark branch of the Packard Motor Car Company, temporary vice-president.

The CCJ has most readers because it gives most information

WESTERN IMPLEMENT COMPANY'S AFFAIRS WOUND UP

The affairs of the Western Implement & Motor Company, of Davenport, Ia., have been finally wound up. In 1911 J. E. Brumeister and others formed the company, and the citizens of Davenport subscribed about $200,000. More money was collected from other towns, banks and real estate men, but the company never had any assets; every dollar was immediately paid out for services to officers and directors on worthless notes, padded expense accounts, etc. The Receiver states that at no time in the history of the company did it have enough money to carry on a legitimate business, and that it only existed on the nerve of its promoters. Officers of the company, from time to time, announced that they had basic patents on nearly every kind of valuable machinery in use, including binders, reapers, gasoline engines, automobile tires, spring wheels, carburetors, cotton pickers, etc. The stockholders lose about $343,000 in cash and real estate which were given for preferred stock, and an unknown amount which was paid in for $1,054,425 common stock. They will get nine cents on the dollar. Among the creditors are Bullock Bros., Chicago, $74,300; J. F. Appleby, $50,000, and W. N. Smith, $20,000. Bullock Bros. have bought the entire movable assets of the company, consisting of unfinished tractors, motors, machinery and fixtures for $6000, on condition that they give up all other claims on the company.

U. S. TIRE COMPANY CHANGES PLANS

The United States Tire Company, which was organized in 1911 to take over the selling of the Morgan & Wright, Hartford, G. & J., and Continental brands of tires, has decided to concentrate the automobile tire production in Detroit and Hartford, which two plants will specialize on automobile tires. All solid tires for motor trucks, carriages and vehicles of all sorts will be concentrated in Providence. The company will continue its policy of furnishing the G. & J. brand through its exclusive list of agents handling these tires and not through its branches.

THE MOTOKART COMPANY ERECTING PLANT

The Motorkart Company is erecting a plant at Scranton, Pa. It has three manufacturing buildings, two 60x300 each, and one 60x260 ft., each three stories, a 40x80 ft. power plant and 60x250 ft., three-story store room and administration building, approximately 5 acres under roof.

Richmond Forging Corporation, (Acca) Richmond, Va., advises that the fire which recently occurred in its forge shop building caused no great delay in its orders, and it is quoting on other business for usual deliveries. Other departments are running as usual and the full equipment will be running by the end of the month. The company has installed wires from the Local Power Company, which, in addition to its own power plant, will put it in a better position than ever for prompt service. A steel building, 70x200 feet, is now in course of construction.

COMING AUTOMOBILE SHOWS AT WHICH COMMERCIAL CARS WILL BE EXHIBITED

January 16-23—Cleveland, Ohio. Wigmore Coliseum. Cleveland Automobile Show Company. Fred. H. Caley, Manager, Hollenden Hotel.

January 16-23—Detroit, Mich. Detroit Lumber Company Building. Detroit Automobile Dealers' Association.

January 18-23—Rochester, N. Y. Rochester Auto Trades' Association. E. M. Alling, Secretary.

January 19-23—Baltimore, Md. Fifth Regiment Armory. Auto Dealers' Association and Auto Club of Maryland. H. M. Luzius, Manager, 12 W. Mt. Royal Avenue.

January 20-23—Lancaster, Pa. Auditorium. Lancaster Auto Trade Association.

January 25-30—Fall River, Mass.

January 26-30—Tiffin, Ohio. C. T. Rodgers, Manager.

January 30-February 6—Minneapolis, Minn. Armory. Minneapolis Automobile Trade Association. R. B. Simming, Secretary, 707 Andrus Building.

February—Grand Forks, N. D. Auditorium. Grand Forks Auto Show Association. L. Stinson, Manager.

February 1-6—Louisville, Ky. Louisville Auto Dealers' Association. P. S. Longest, Secretary, 725 South Third Street.

February 2-7—Kalamazoo, Mich. Armory.

February 3-6—Geneva, N. Y.

February 3-6—St. Joseph, Mo. Auditorium. St. Joseph Automobile Show Association. R. R. Calkins, Manager. German-American Bank Building.

February 6-13—Hartford, Conn. State Armory. Hartford Automobile Dealers' Association. Mr. Smith, Manager.

February 8-13—Elmira, N. Y. State Armory. Elmira Auto Club. Frank D. Pratt, Manager, 210 E. Water Street.

February 8-14—Troy, N. Y. Bolton Hall. Troy Automobile Dealers' Association. Frank M. Baucus, Manager.

February 8-14—Kansas City, Mo. Convention Hall. Kansas City Motor Car Dealers' Association. E. E. Peake, Secretary, 909 Gloyd Building.

February 9-12—Peoria, Ill. Peoria Automobile and Motorcycle Dealers' Association. A. H. Whigan, Manager, Niagara Hotel.

February 15-20—Bridgeport, Conn. State Armory. B. B. Steiber, Manager, 925 Main Street.

February 15-20—Omaha, Neb. Auditorium. Omaha Auto Show Association. C. G. Powell, Manager, 2119 Farnum Street.

February 15-21 — Grand Rapids, Mich. Klingman Furniture Building, Grand Rapids Herald. A. H. Vandenberg, Editor.

February 23-27—Syracuse, N. Y. State Armory. Syracuse Auto Dealers' Association. H. T. Gardner, Manager, 100 Prospect Place.

February 23-27—York, Pa. Coliseum Hall.

February 23-27—Fort Dodge, Ia. Armory. Fort Dodge Auto Dealers' Association. G. W. Tremain, Secretary, 1104 Central Avenue.

March — Watertown, N. Y. Watertown Automobile Association. Arthur E. Sherwood, Manager, 4-6 Flower Building.

March 6-13—Boston, Mass. Mechanics' Building. Boston Auto Dealers' Association. Chester I. Campbell, Manager, 5 Park Square.

March 8-13—Des Moines, Ia. Coliseum. Des Moines Auto Dealers' Association. C. G. Van Vliet, Manager, 409 Observatory Building.

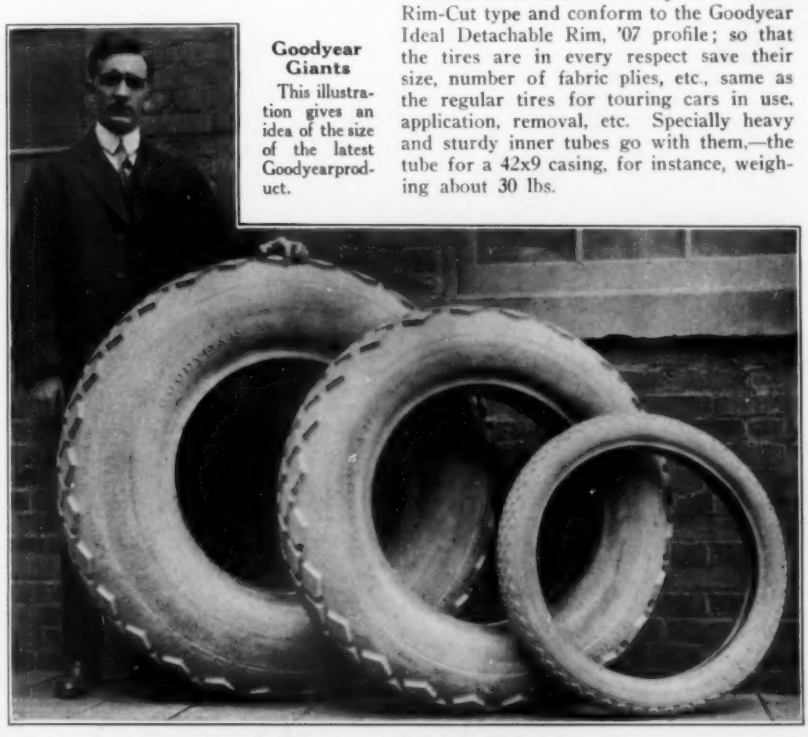
March 9-13—Piqua, Ohio. E. Huntzinger, Manager.

March 15—Cedar Rapids, Ia. Auditorium. Cedar Rapids Auto Dealers' Association. Martin Beck, Manager. First Avenue, West.

GOODYEAR MAKING HUGE PNEUMATICS

A large number of veritable giants in pneumatic tire form are being turned out by the factory of the Goodyear Tire & Rubber Company these days,—and are making a more and more general appearance in use on trucks in various cities of the country. For more than a year Goodyear has been developing large pneumatics for truck use, with marked success. Some experimental giants have been in steady work on customers' trucks since March last. At this stage Goodyear has confined its attention to three "popular" truck tire sizes in pneumatics,—38x7, with rated carrying capacity per tire of 2500 lbs.; 42x9, carrying capacity per tire, 4500, and 48x12, carrying capacity 7500 lbs.

These tires are made only in the No-Rim-Cut type and conform to the Goodyear Ideal Detachable Rim, '07 profile; so that the tires are in every respect save their size, number of fabric plies, etc., same as the regular tires for touring cars in use, application, removal, etc. Specially heavy and sturdy inner tubes go with them,—the tube for a 42x9 casing, for instance, weighing about 30 lbs.



Goodyear Giants

This illustration gives an idea of the size of the latest Goodyear product.

The CCJ has most advertisers because it gives them biggest returns

Personal Items

Marc L. Tooker has become head of the advertising and sales departments of the American Bronze Company, Berwyn, Pa.

E. M. Caskey, formerly with the S. F. Bowser Company, Inc., Ft. Wayne, Ind., is now sales manager of the Lavigne Gear Company, Racine, Wis.

Wallace C. Capen, for 10 years a prominent figure in the automobile industry, has become manager of the St. Louis branch of the White Company.

Martin L. Pulcher, manager of the Federal Motor Truck Company, has been elected president of the Wolverine Automobile Club, Detroit, Mich.

E. S. Madden, formerly credit manager of the M. Rumely Company, Laporte, Ind., is now assistant treasurer of the Willys-Overland Company, Toledo, Ohio.

F. G. Woods, formerly connected with the White Company, in Boston, Mass., and Providence, R. I., is now truck sales manager for the same company in New Haven, Conn.

F. George Walker is now in charge of the Detroit office of the Royal Equipment Company, of Bridgeport, Conn., manufacturer of Raybestos brake lining and clutch lining.

Claude A. George, formerly export sales manager for Overland Motor Car Company, is now representing the O. K. Light Delivery Truck Company, Detroit, in all Europe.

William V. Forrest, chief engineer of the Dunlop Wire Wheel Corporation of America, New York City, has resigned that position. His future association is not yet announced.

E. A. Walton, advertising manager of the Timken-Detroit Axle Company, Detroit, has resigned that position to return to the Burroughs Adding Machine Company in the same capacity.

Henry T. Meyers, former manager of Boston branch of Studebaker Corporation, succeeded Charles B. Van Horne as chief of commercial vehicle department of Studebaker Corp., Detroit.

R. R. Bush, formerly sales manager, has become manager of the Velie Motor Vehicle Company, and the Velie Engineering Company, Moline, Ill., with full charge of the affairs of both companies.

W. H. Corbett, formerly with the traffic department of the Pennsylvania Railroad, is now in charge of the advertising and publicity department of the Motz Tire & Rubber Company, Akron, Ohio.

A. R. Anderson has become manager of the International Harvester Corporation's St. Louis branch, succeeding H. L. Brubacker, who now has charge of the company's office in Madison, Wis.

George H. Lloyd has become sales manager of the Velie Motor Vehicle Company and the Velie Engineering Company, Moline, Ill., succeeding R. R. Bush, who has been promoted to position of manager.

W. C. Du Comb, Jr., who has been in charge of the engineering department of Barthel & Daly, New York City, sole importers of Schafer ball bearings, has been appointed sales manager and engineer.

D. C. Hathaway, who has been prominently identified in Cleveland, Ohio, with tire sales, has joined the sales department of the Kelly Springfield Company, confining his efforts to the solid tire department.

G. Gray Lemley, for 2 years purchasing agent for Ballou & Wright, is now manager of the Seattle store of same company, succeeding A. H. Jones, who retired to devote his time to developing a new non-skid tire.

George Elliott, formerly connected with James Boyd & Company, Philadelphia manufacturers of auto radiators, fenders, etc., as manager, is now with the Dolphin Radiator and Fender Company, Baltimore, Md.

H. T. Wheelock has become manager of the advertising department of the Velie Motor Vehicle Company and the Velie Engineering Company, Moline, Ill., in addition to his connection with the motor truck sales.

J. O. Dahl, formerly northwestern manager for the Sandbo Starter Company, Detroit, has resigned and entered the employ of the Red River Automobile Supply Company, Fargo, N. D., as manager and president of that concern.

J. E. Schneder, formerly secretary, treasurer and purchasing agent of the Speedwell Motor Car Company, and recently a buyer at the N. C. R. Company, has become purchasing agent of the Troy Carriage Sunshade Company, Troy, Ohio.

Captain William Sparks, secretary, treasurer and general manager of the Sparks-Withington Company, Jackson, Mich., took office on January 1st as the first mayor under the new charter recently inaugurated for commission form of municipal government.

E. B. Finch has recently become sales manager of the Standard Motor Truck Company, Detroit, Mich. He will also assist A. Fisher, president, in supervising other branches of the business, and will give special attention to the service division.

W. D. Rouetan, formerly secretary to W. C. White, vice-president and general manager of White Company, Cleveland, has been made manager of London Branch, succeeding Manager Coleman, who has gone to the front as automobile aid to General French.

Francis V. McGinness, sales engineer of the Edison Storage Battery Company, Orange, N. J., has been appointed assistant manager of the Railway Department, taking the position of William F. Bauer, who was recently made manager of the company's Chicago office.

Russell T. Kingsford, chief engineer of the Rushmore Dynamo Works, branch of the Bosch Magneto Company, New York City, has resigned that position to accept one in charge of the private laboratory of S. W. Rushmore, who recently sold out the Plainfield works to the Bosch Company

George H. Bryant, formerly advertising manager of the H. H. Franklin Manufacturing Company and the Velie Motor Vehicle Company, is now associated with the Williams & Cunningham Advertising Agency, and will especially look after the advertising of the Thomas B. Jeffery Company.

Nelson Pringle, experimental engineer for the Autocar factory at Ardmore, Pa., has been appointed manager of the Newark, N. J., office, and will have full charge of sales and service covering northern New Jersey, and will also act in an advisory capacity to both New York and Boston offices.

W. S. Hill, district manager in Buffalo, of the Denby Motor Truck Company, of Detroit, made a 3,000-mile trip in a Denby truck through western New York, West Virginia, Pennsylvania, Ohio and Kentucky, and secured distributors in Erie, Pittsburgh and Kane, Pa.; Cincinnati, Louisville, Cleveland and Buffalo. The trip took about 30 days, making the average day's run 100 miles, though at times nearly twice that distance would be covered when no important stops were made.

Changes and Factory News

Peerless Air Motor Company, Stanfield, Ore., is to erect a windshield factory 50x100 feet.

United States Tire Company, New London, Wis., is to erect a four-story addition 70x70 feet to its factory.

Gramm Motor Truck Company, Lima, Ohio, is to enlarge its plant to almost double the present capacity.

St. Louis Welding & Manufacturing Company, St. Louis, Mo., has leased a two-story factory 100x100 feet at 3326 S. Broadway.

Standard Tire & Rubber Manufacturing Company, Willoughby, Ohio, is to erect a steel frame factory addition at a cost of $25,000.

Edmunds & Jones, Detroit, lamp manufacturers, are to build a new one-story addition 60x100 feet to their plant at a cost of $20,000.

Goodrich, B. F., Company, Akron, Ohio, will erect a two-story addition to its plant which will be known as Plant No. 26. The cost will be approximately $5,000.

Storms Electric Car Company, Detroit, Mich., has leased a plant formerly occupied by the Mercury Cyclecar Company. The building has a floor space of 25,000 square feet.

Ingram-Hatch Motor Corporation, 2 Stone St., New York City, plans to build a plant at Calgary, Alberta, Canada, for the manufacture of automobiles and motor trucks operated by oil engines.

Republic Motor Truck Company, Alma, Mich., has acquired an additional building which will be used as a paint shop. This will allow more room in the main building for manufacturing purposes.

William & Harvey Rowland Company, Inc., Philadelphia, Pa., manufacturers of vehicle springs, has opened offices in the Dime Savings Bank Biulding, Detroit, Mich., with E. B. Busby in charge.

Pierce-Arrow Motor Car Company, Buffalo, N. Y., has bought a site at Elmwood Ave. and the New York Central Railroad tracks upon which will be built a plant for the manufacture of motor trucks.

Disco Electric Starter Company, Leib and Larned Sts., Detroit, Mich., desires to rent 25,000 square feet of floor space, or to buy a site upon which a large building having the same amount of floor space may be erected.

C. H. & E. Manufacturing Company, Milwaukee, Wis., manufacturer of gasoline motor vehicle engines, is erecting a new two-story factory building 100x100 feet at Clinton and Mineral Sts., which will double the output.

Miller Rubber Company, Akron, Ohio, has started work on three new shop buildings, and will also construct a storage house and drying room 40x100 feet. These new buildings of tile, steel and brick, will replace old wooden structures, and will cost about $280,000.

The Bearings Company of America, recently organized, is the successor of the J. S. Bretz Company, New York City, the Fichtel & Sachs Company and the Star Ball Retainer Company, both of Lancaster, Pa. All three of the old companies were dissolved last year, and the entire manufacturing, warehousing establishment and service department will be concentrated at Lancaster, and the entire sales departments at 250 W. 54th St., New York City. No change has been made in the personnel of the general management of the business.

The CCJ leads in circulation, advertising and prestige

New Agencies and Changes

Blake Auto Company, Cedar Rapids, Ia., have taken agency for Nevada truck.

F. S. Howard, 746 Main St., Worcester, Mass., has taken agency for Vim trucks.

Hanson & Tyler Auto Company, Webster City, Ia., have taken G. M. C. truck agency.

Osen & Hunter Auto Company, Oakland, Cal., have secured agency for Signal trucks.

Hatsfield Auto Company, Nashville, Tenn., have taken agency for Republic trucks.

Adalian Brothers, 1 St. James Ave., Boston, Mass., are handling Koehler one-ton truck.

Arthur Power, 334 W. Jefferson Ave., Detroit, Mich., has taken agency for O. K. 1500-lb. truck.

West End Auto Repair Company, 5891 Delmar Boulevard, St. Louis, Mo., have taken agency for Knox tractor.

Edward S. Clark, 183 Allyn St., Hartford, Conn., dropped the agency for Modern truck and has taken agency for G. M. C. trucks.

Magnolia Motor Sales Corporation, Main St. and Dallas Ave., Houston, Texas, has taken the agency for the Vim light delivery wagon.

Verkler-Curless Auto Company, with headquarters at 229 S. Water St., Peoria, Ill., has been formed for the purpose of handling automobiles and motor trucks.

Peerless Motor Car Company, Cleveland, Ohio, has discontinued its Boston office as a factory branch. The Beacon Motor Car Company has been formed to handle the Peerless in that city.

Electrical Alloy Company, Morristown, N. J., has opened offices at 180 N. Dearborn St., Chicago, in charge of L. L. Fleig & Company, which has been appointed western representative.

Standard Motor Truck Sales Company, with headquarters at 1824 Euclid Ave., Cleveland, Ohio, has been formed to take over the sales of the Standard trucks in that vicinity. The officers of the new company are: Emil Petersilge, president, treasurer and general manager; Arthur Petersilge, vice-president, and T. L. Petersilge, secretary.

New Incorporations

The Astoria Auto Trucking Corporation, of Long Island City, capitalized at $3000, has been chartered.

Unity Tractor Company, Antigo, Wis., has been incorporated for the purpose of manufacturing utility trucks.

U-H Magneto Company, Harrington Park, N. J., has incorporated with a capital of $150,000, to manufacture magnetos, etc.

Yakima Ave. Auto & Wagon Works, Yakima Ave. and 11th St., Tacoma, Wash., has been formed by W. H. Ortwein and J. G. Owens. The new firm will specialize in building and rebuilding commercial bodies, wheels and other parts.

Hood Tire Company, Watertown, Mass., has been organized as a distinct organization to manufacture motor vehicle tires. The work has heretofore been done as part of the general product of the Hood Rubber Company. Charles W. Daily is president and treasurer of the new company.

The German Army is using motor trucks equipped with scythes, which enable them to cut through hedges and fences.

Conventions of Interest to the Trade

The list of conventions given herewith is published each month, so that commercial car manufacturers can communicate with the proper authorities, with the idea of arranging to give lectures, illustrated talks, statistics, etc., to show the advantage of motor trucks in these various lines; also, possibly, to show and demonstrate their cars.

National Conventions

January 19-21—at Minneapolis, Minn. National Convention Independent Telephone Association of America. Hotel Radisson. The State association of independent companies will convene at the Dyckman, on the same dates.

January 21-22—at New York City. Wholesale Dry Goods Association. Waldorf-Astoria. Address: Merchants' Association.

March 9-11 — at Mason City, Iowa. National Creamery Buttermakers' Association. M. H. Meyer, 1011 West Washington Avenue, Madison, Wis., Secretary.

August 5-6—at San Francisco, Cal. National Top Notch Farmers' Club. Address Convention League.

State Conventions and Fairs

January 19-21—at Fargo, N. D. Tri-State Grain Growers' Association. Address Commercial Club.

January 20-22—at Spokane, Wash. Retail Hardware Dealers' Association.

January 25-26—at Little Rock, Ark. Good Roads and Drainage Association. Hotel Marion. C. M. Philpot, of Pine Bluffs, is president.

January 26-28—at Waco, Tex. Retail Hardware Association Convention. Henry Mart, of Dallas, Secretary.

January 26-29—at Portland, Ore. Retail Hardware Dealers' Association.

January 26-29—at Indianapolis, Ind. Retail Hardware Association. M. I. Corey, of Argos, Secretary.

February 2-4—at Fon du Lac, Wis. Buttermakers' Association. G. H. Benkendorf, Madison, Wis., Secretary.

February 3-5—at Milwaukee, Wis. Retail Hardware Dealers' Association. New Auditorium. P. J. Jacobs, of Stevens Point, is Secretary.

February 3-5—at Peoria, Ill. State Dairymen's Association. At the Coliseum. George Caven, 136 West Lake Street, Chicago, Secretary.

February 9-12—at Omaha, Neb. Nebraska Retail Hardware Association. Nathan Roberts, of Lincoln, Neb., Secretary.

February 9-12—at Saginaw, Mich. Retail Hardware Association Convention and Exhibit will be held in Auditorium. Hotel Vincent, headquarters. A. J. Scott, of Marine City, Mich., Secretary.

February 10-11—at Manchester, N. H. Thirtieth Annual Convention of Granite State Dairymen's Association at St. Cecelia Hall. Manchester Publicity Association is interested.

February 10-12—at Toledo, Ohio. Builders' Supply Association. R. E. Doville, of Toledo, is President, and J. C. Neeley, of Canton, Secretary.

February 10-12—at Memphis, Tenn. Retail Hardware Association. C. C. Paris, of the Union Hardware Company, Secretary.

February 16-19—at Des Moines, Iowa. Retail Hardware Dealers' Association. At Coliseum. A. R. Sale, Secretary, Mason City.

February 16-19—at Syracuse, N. Y. Retail Hardware Association Convention. John B. Foley, Secretary, 513 Kirk Building, Syracuse, N. Y.

February 16-19—at Cincinnati, Ohio. Retail Hardware Dealers' Association State Convention. Headquarters at new Gibson Hotel. Exhibit at Music Hall. James B. Carson, of Dayton, Secretary.

February 17-18—at Pittsburgh, Pa. Retail Lumber Dealers' Association of Pennsylvania. Hotel Henry. Address Chamber of Commerce.

February 17-19—at Fargo, N. D. Annual Convention of North Dakota Hardware Association. C. N. Barnes, of Grand Forks, is Secretary.

February 19-22—at St. Louis, Mo. Retail Hardware Association and Mississippi Valley Implement and Vehicle Association Annual Convention. F. X. Beeherer, Secretary, 5136 North Broadway.

February 22-24—at Boston, Mass. New England Retail Hardware Association. Mechanic Building, Huntington Avenue. George A. Fiel, Secretary, 176 Federal Street, Boston, Mass.

February 23-25—at Lexington, Ky. Retail Hardware and Stove Dealers' Association to convene. Headquarters are at Phoenix Hotel. J. M. Stone, of Sturgis, Ky., Secretary.

February 23-26—at St. Paul, Minn. Retail Hardware Association of Minnesota. H. O. Roberts, Metropolitan Life Building, Minneapolis, Secretary.

February 24-25—at Fargo, N. D. State Lumbermen's Association. In Auditorium. F. C. Poter, of Cooperstown, is President.

March 2-5—at Mitchell, S. D. Retail Hardware Dealers' Association. Meetings in Elk's Hall. Exhibits in Auditorium of the City Hall. E. C. Warren, Secretary, Pierre, S. D.

March 10-11—at Scranton, Pa. Pennsylvania, New Jersey and Delaware Grocers' Association. Address Alvin M. Graves, 690 Bourse Building, Philadelphia, Pa.

March 16-18—at San Francisco, Cal. State Retail Hardware Association. Address L. R. Smith, 561 Sixteenth Street, Oakland.

May 11-13—at St. Petersburg, Fla. Retail Hardware Association. G. E. Noblit, Tarpon Springs, Secretary.

June 7—at Reading, Pa. One week. Industrial Exposition. Address Industrial Committee, Chamber of Commerce.

July 13-16—Isle of Palms, Carolinas Retail Hardware Association Convention. T. W. Dixon, Secretary, Charlotte, N. C.

August — at Reading, Pa. Retail and Wholesale Liquors Dealers' Association. Address Publicity and Convention Bureau of Chamber of Commerce.

Firemen's Convention

July 13-15 — at Petroskey, Mich. State Firemen's Association. A. P. Lane, of Ithaca, Mich., Secretary.

Personal Items—Retail

M. B. Strauss, of St. Louis, Mo., was recently elected chairman of the St. Louis section of the Electric Vehicle Association of America succeeding C. A. Michel, resigned.

E. O. Hoopengarner, for 10 years branch manager of the Swinehart Tire & Rubber Company's New York City office, has resigned that position. He has not yet announced his future connection.

G. N. Jordan has been appointed manager of Boston branch of Studebaker Corporation to succeed Henry T. Meyers, who has been called to Detroit to take charge of the commercial car sales of Studebaker Corporation.

Henry A. Kroh has become New England representative of the Continental Asbestos Company, with headquarters at 171 Huntington Ave., Boston, Mass. He has been identified for many years with the motor vehicle field in Boston.

W. T. Bush, formerly sales manager of the Abbott Motor Car Company, has been appointed manager of the Michigan branch of the Studebaker Corporation, Woodward Ave., and Charlotte St., Detroit, succeeding A. K. McLuney, resigned.

E. J. McLaughlin, formerly sales manager of the Saxon in New York territory, now general sales manager of the Hudson-Bender Motor Car Company, Kane, Pa., distributor of Hudsons in thirteen counties in Pennsylvania and three in New York.

W. H. Barnes, formerly Seattle distributor of the G. M. C. trucks, has become Pacific coast manager of the General Motors Truck Company, Pontiac, Mich. He will spend half the year in Seattle and the other half in San Francisco, and will also have supervision of the wholesale sales of the G. M. C. in California.

Peoples' 'Bus & Transfer Line, of Bloomington, Ill., is building plans for a contract delivery system. Several motor 'buses will be purchased, and the city divided into districts, with probably one 'bus for each section. It is planned to contract with the different merchants to do their delivery work, and make several deliveries a day.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

M. L. TOOKER NEW SALES MANAGER OF AMERICAN BRONZE COMPANY

M. L. Tooker, who became associated with the American Bronze Company somewhat over a year ago, has demonstrated his ability and progressiveness to such an extent that he was recently promoted to the position of sales and advertising manager. Before joining the American Bronze Company Mr. Tooker was associated with the Curtis Publishing Company, occupying a number of responsible positions in their organization and latterly having been manager of the copy and contract department of the Philadelphia Public Ledger. He is an experienced advertising man and has demonstrated, during his connection with the American Bronze Company, his ability in the sales department to such an extent that he thereby earned his promotion.

E. V. A. SECTIONAL ACTIVITIES

At the December 8th meeting of the Chicago section, Chairman W. J. McDowell started a discussion on "Best Ways and Means for Promoting the Electric Commercial Vehicle in Chicago," offering the following suggestions:

(1) An advertising campaign, featuring electric trucks; (2) an occasional moving picture film which could be released to theatrical houses scattered throughout the city; (3) that the Commonwealth Edison Company give a year's supply of electricity to each purchaser of a new electric truck; and (4) that the secretary's office be made a clearing house for prospects so that all commercial car salesmen will be called in on each and every job, to better combat the idea that everything is gasoline, which opinion is so often formed from the greater preponderance of gasoline salesmen over the electric.

At a meeting of the Philadelphia section, on December 9th, G. O. Simpson spoke on "The Development of the Pneumatic Tire and Its Highest Type, the Cord Tire."

The principal attraction at the December 10th meeting of the Washington section was a paper entitled "Electric Vehicle Motor Characteristics," presented by A. L. Broomal, electric vehicle motor designer of the Westinghouse Electric and Manufacturing Company. This paper was accompanied by lantern slides, showing diagrams and pictures.

M. O. Eldridge, Assistant in Road Economics, Office of Public Roads, United States Department of Agriculture, presented a lecture on road building in the United States. This lecture was illustrated with lantern slides and moving pictures, the latter taken for the Panama-Pacific Exposition, and dealt with the economic, administrative and practical features of road building. Mr. Eldridge showed slides of good and bad roads in various parts of the United States and described in connection with these illustrations the best methods employed in the construction of the standard types of roads, such as gravel, macadam, brick and concrete.

The Washington section held a meeting on January 14, 1915, at which Mr. Heacock, Superintendent of Mails in Washington, spoke on "Vehicle Requirements in the Mail Service."

M. A. M. ELECTS OFFICERS AND DIRECTORS

The Motor and Accessory Manufacturers at a recent meeting of the Board of Directors, elected the following officers for a term of one year: F. Hallett Lovell, Jr., of the Lovell-McConnell Manufacturing Company, Newark, N. J., president; C. W. Stiger, Stromberg Motor Devices Company, Chicago, first vice-president; C. E. Thompson, Electric Welding Products Company, Cleveland, second vice-president; T. J. Wetzel, Dyneto Electric Company, New York City, third vice-president; L. M Wainwright, Diamond Chain and Manufacturing Company, Indianapolis, treasurer, and Alfred P. Sloan, Jr., Hyatt Roller Bearing Company, Newark, N. J., secretary and assistant treasurer.

At the Twelfth Annual Meeting of the Association held on January 6th, there was a very representative attendance of members. E. H. Broadwell, of the Fisk Rubber Company, Christian Girl, of the Perfection Spring Company, and E. W. Beach, of the Manufacturers Foundry Company, were elected as members of the Board of Directors for a term of 3 years, and to succeed those whose terms have expired L. H. Wainwright was elected as a member of the Board. The following directors declared themselves unable to accept re-election. H. T. Dunn, F. C. Billings and E S. Fretz.

THE WALKER VEHICLE COMPANY BUYS CHICAGO ELECTRIC

Chicago Electric Motor Car Company, Chicago, has been purchased by the Walker Vehicle Company, manufacturer of the Walker commercial truck, who will continue the manufacture and sale of the Chicago Electric at the Walker plant, 531-45 W. Thirtieth Street, Chicago. Sales office, display rooms and service department have been located at 2700 Michigan Avenue.

Wm. A. Fox, vice-president of the Commonwealth Edison Company, has been elected president of the Walker Vehicle Company, and G. A. Freeman, identified with the Commonwealth Edison Company, is vice-president. Practically the complete organization of the Chicago Electric Motor Car Company, including the factory and service men, will continue with the Walker Vehicle Company, handling the sales and service departments. Gail Reed, formerly secretary and sales manager of the Chicago Electric Motor Car Company, has been appointed general sales manager.

NATIONAL FOREIGN TRADE CONVENTION

On January 21st and 22d, the Second Annual Foreign Trade Convention will be held at St. Louis. The purpose is to promote a co-ordinated effort of the entire nation—manufacturers, merchants, bankers, carriers and all others, to take the proper advantage of the trade opportunities offered American goods by the European war. Papers will be read to show the ways and means of doing this.

Polk County, Tenn., has purchased two White machines for road work.

BUFFALO ELECTRIC SUSPENDS BUSINESS

The Buffalo Electric Vehicle Company, Buffalo, N. Y., has found it necessary to suspend active business. Since July 1st the company has been endeavoring to dispose of an issue of bonds, but, on account of the general business depression, has been unable to do so. The Board of Directors has decided to dispose of the assets of the company and desires to do so to the best possible advantage of the creditors. John W. Van Allen, 684 Illicott Square, Buffalo, has been selected to represent the interests of the stockholders and term noteholders, and the Marine National Bank, of Buffalo, which is a creditor to the extent of practically three-fourths of the indebtedness, has selected Frank L. Bapst to represent its interests in the liquidation.

ONE HUNDRED DOLLARS FOR A NAME

Joseph T. Ryerson & Son, Chicago, Ill., who are manufacturing a special quality of tool steel, are offering prizes for a suitable name for this special steel, a name which will not conflict with those already in use for similar material. The prizes for names total $325. One hundred dollars in gold will be given for the winning name and three hundred prizes will be given to others for names submitted. The full particulars are given in a booklet, which can be had by writing to Ryerson & Son.

GOODYEAR TO TAKE OVER SALE OF MOTZ TIRES

The Goodyear Tire & Rubber Company, after February 1st, will take over the sale of the products of the Motz Tire & Rubber Company. The same officers and employees will probably be retained by the Goodyear Company. The Motz Company never had a shop of its own, but had the Goodyear people manufacture all its articles, which were principally cushion tires for auto trucks and electrics. After the above date, the Goodyear Company will make all sales and adjustments. For the present the sale of Motz tires will be handled as a part of the work of the Goodyear motor truck department, under the direction of C. W. Martin, Jr., manager of that department.

Receiver George Pope, of the Pope Manufacturing Company, will shortly ask for an order to pay another dividend of 10 per cent. to creditors. He has about $150,000 on hand.

Wohlfeld Trunk & Bag Company, Philadelphia, Pa., has made application to the County Court of Philadelphia to be dismissed from bankruptcy. A hearing on said application will be held at the United States District Court, at Philadelphia, on February 17th, at 10 A. M.

Roland Gas-Electric Vehicle Corporation, New York City, is winding up its affairs after having been in business a little over a year. It made an assignment to Clifford G. Ludvigh, and a petition in bankruptcy has been filed against it by Henry B. Swiger, an attorney. Liabilities are $55,000 and the nominal assets $25,000. The company manufactures trucks of gasoline and electric types.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

Midwinter Meeting of the S. A. E.

New President Elected—Many New Standards Recommended for Adoption

THE first business of the opening session of the Society of Automobile Engineers' annual meeting, at New York City, January, 1915, was the report of the tellers of election of officers, which made known the election of William H. VanDervoort as the president of the organization for this year.

In his address Mr. VanDervoort commented on the difficulties which beset the automobile manufacturer to-day and of the great reductions in manufacturing cost which now characterize the motor car industry.

The other officers of the society elected at this meeting were: F. R. Hutton, first vice-president; Joseph A. Anglada, second vice-president; Arthur B. Cumner, treasurer; councillors, William P. Kennedy, C. B. Rose, F. M. Germane, John Wilkinson.

Results of the Standards Committee Meeting

At the meeting of the Standards Committee of the S. A. E., January 6, 1915, in conjunction with the annual meeting of the society, the following reports of committees were approved for adoption:

Sixth report Electrical Equipment Division.
Fourth report of the Frame Sections Division.
Second report of Lock Washer Division. (Except part pertaining to machine screws.)
Fifth report of Carbureter Fittings Division.
Electric Vehicle Division.
Fifth report of Miscellaneous Division.
Ball and Roller Bearing Division. (Progress report.)
Fourth report of Springs Division.
Standards Exchange Division.
Iron and Steel Division.
Nomenclature Division. (Progress.)
Third Report Pleasure Car Wheels Division.
Third report on Standard Tires and Rim Sizes.

The Iron and Steel Division report, giving the physical characteristics of many of the S. A. E. steels as well as the chemical analysis, was passed in toto. The report suggests the special uses for which the various steels are made up and goes into the matter of heat treatment and machining.

Standardization of Bell Housing

The Standards Exchange Division submitted a report on standard dimensions for bell housings, looking toward the interchangeability of motors and transmissions. If the recommendation of this report as accepted by the society become general practice, in unit power plant construction a great deal of the bothersome special work which now characterizes this branch of the industry will be eliminated. This means a further saving in cost of production which will eventually find its way into the pockets of the ultimate consumer.

S. A. E. Investigating Road Taxation Formula

A report made to the Society of Automobile engineers at its annual meeting by the Research Division of the Standards Committee disclosed the fact that the United States Government is now conducting a series of road experiments, the results of which will aid materially in the developing of an engineering formula by the S. A. E. for vehicle taxation, based in part at least on road destructive effect.

Henry Souther, Standards Committee Chairman, Honored

One of the most interesting features of the meeting was the presentation by his associates to Henry Souther, Chairman of the Standards Committee, of a token of the admiration and affection in which he is held. The presentation took the form of a silver piece suitably engraved. It was also announced that Mr. Souther had been made a life member of the society in recognition of his distinguished achievement in the orderly development of the art of automobile engineering.

In relinquishing the chairmanship, owing to the press of other duties, Mr. Souther stated forcefully that the work of standardization in the automobile and allied industries has only begun. He made clear the necessity of the executives of car manufacturing companies, becoming familiar with the S. A. E. standards.

Extracts of Papers Read at the Meeting

ALLOWANCES FOR PISTON FITS

By E. W. WEAVER, Member of the Society

THE question of the fit of the piston in the cylinder is not that of a solid plunger operating in a cylinder of heavy enough body and surrounded by such conditions as to insure an unchanging form, and permitting of copious lubrication. The problem is that of a comparatively delicate piston working in a cylinder the walls of which are as thin as the designer dares make them and which is subject to great variations of temperature at different points. Lubrication, too, must be held down to the minimum in order to conform to various smoke ordinances, or lacking such inducements, to one's own sense of the fitness of things.

The question of the ideal allowance to make will be considered apart from that of manufacturing tolerances. Some engineers use the very convenient rule of making the piston .001 small for each inch of diameter of the cylinder bore. I believe that the following rule comes closer to actual requirements: Allow from .002 to .0025 for each inch of diameter above 2 inches. This is shown graphically in the accompanying chart.

As it is impossible to manufacture commercially parts that are all exactly alike, due allowance must be made for variations. The engine builder has the choice of the following three methods: (1) Putting limits on the drawings and holding the inspection to such a point that any piston will work in any cylinder; (2) sorting the cylinders and pistons according to size, and assembling the large pistons in the large cylinders, etc.; (3) making all the pistons a closer fit than they are expected to run and lapping them down to the proper fit, each in its own cylinder.

I shall in this paper touch on the first method only, that of strictly interchangeable production. The fixing of the limits to which the shop is to work is very important, as it affects directly the cost of the product. My idea is that the drawing should represent what the engineer expects, what the shop will guarantee, and what the company is willing to pay for.

Considering the cylinder first, a permitted variation between maximum and minimum size of .0015 is absolutely necessary—.002 is the ordinary allowance—and the cylinder must not be tapered or be "out of round" to in any wise exceed the given allowance. A variation of .001 between the maximum and minimum for the piston is the usual allowance. If wider limits are given, more care must be exercised in assembling, or the quality of the engine will be lowered.

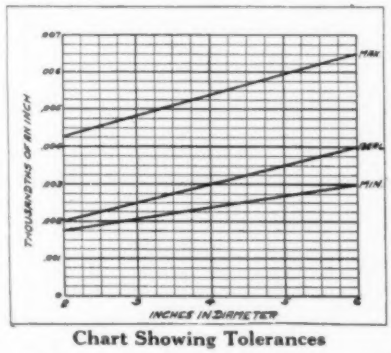


Chart Showing Tolerances

The head of the piston, being exposed to the intense heat of the explosion, must be made considerably smaller than the skirt. The amount is usually fixed at from .002 to .0025 small for each inch in diameter.

The fit of the piston ring in the groove is another particular point. The ring must be loose enough to operate freely and close enough to prevent gas from leaking past. The minimum allowance that is safe is .0005, and the tolerance on both ring and groove must be in such a way that this allowance is not diminished. The closest limits that are being worked to commercially are .0005 variation between the minimum and maximum of both ring and groove width. This would be expressed

$$\frac{.2500}{.2490}$$

on the drawing as .2495 for the width of the groove and .2485 for the ring.

Allowance must be made between the ends of the piston ring for expansion under heat. From .006 to .015 is the usual amount allowed.

The fit of the piston-pin in the piston is the final point at which great care must be exercised, the proper allowance for the fit being .001 of an inch. The hole in the piston being reamed or broached can be held from exact size to .0005 under size. In the case of a one-inch piston pin, the hole in the piston would be dimensioned from 1.000 to .9995, while the piston-pin would be given as .9990 to .9985, thus insuring a minimum allowance of .0005 and a maximum allowance of .0015.

(*S. A. E. Papers continued on page 53*)

The CCJ has most readers because it gives most information

THE COMMERCIAL CAR JOURNAL

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AGAIN WE PROPOSE ONE NATIONAL TRUCK SHOW

FOR two years the commercial car interests of the country have had no opportunity to show to the public their progress. Since the discontinuance of the commercial car shows manufacturers and agents had no chance to get together as formerly at the national exhibits.

As early as August of 1912, the year before the commercial car shows were discontinued, we believed that two shows were too much of a burden and advocated one separate and distinct commercial car show, to be held preferably in the fall. At that time our canvass of the truck makers showed the majority to be in favor of one big national show, although a report given out by the N. A. A. M. showed a different result. This it was believed, however, was owing to the fact that the winter shows had already been scheduled, and they were merely asking opinions as to the advisability of holding a summer show in addition, which would have made three instead of two national exhibits.

The following is a quotation from our editorial on the subject at that time: "We wish it distinctly understood that we are advocating one and only one national commercial car show for the year, and that to take place during the fall and to include open-air features and arrangements which will permit of effective demonstrations. We are emphatically against imposing an additional burden on the entire trade by having a large summer exhibition in addition to the winter show."

In March, 1913, we again made a plea for one big national show. The next month the N. A. A. M. discontinued all truck shows, but in the same month we again pointed out the advantages and the advisability of having at least one national demonstration of the truck interests. We now feel that the time is again ripe for this suggestion.

There is again a growing demand that some demonstration be made on the part of the commercial car industry. The recent Get-Together Convention at Detroit was undoubtedly an outcropping of this sentiment and the truck show at Detroit is the present expression of the same feeling.

It is recognized that a national gathering, convention, or show of some kind is almost essential to the welfare and to the unity of the commercial car branch of the automobile industry. That this feeling will ultimately crystallize in some kind of a national meeting we believe to be inevitable, and that it will take the form of a show is most probable.

For the last two years the industry has been passing through a depression, and has been spared this show expense during a period when it could least afford it. Now, however, truck manufacturers, parts and tire makers are exceedingly active caring for business brought about by the European War. The period of depression can no longer be said to exist. The industry as a whole has received a marked and beneficial stimulus, and we believe that the time is now ripe for one big national show of the commercial car interests of the country, held preferably in the fall in the Middle West, and entirely independent of any pleasure car exhibition.

THE JOKER IN THE MANUFACTURER'S GUARANTEE

WHEN the purchaser buys his truck he is consoled by the fact that he is purchasing a machine of standard make with a reputable manufacturer behind it. He is pleased when he reads that all defective parts, either in material or workmanship, will be replaced free of charge, and goes on his way rejoicing,—until something happens.

A part breaks which has no business to break under ordinary conditions. Examination proves to the owner's satisfaction that the part is defective. He goes to the agent or branch and their expert goes over the break, and he admits that the part is defective. The branch manager or agent says smilingly, "I guess we'll have to replace this for you; I'll wire the factory at once." This usually means a delay of a few days. If, however, the part is already in stock, they proceed to install it at once, which necessitates the removal of one part or another, often several parts. Supposing, for instance, one side frame member has cracked just to the rear of the driver's seat. This unfortunately means the dismantling and removal of almost everything in the truck.

At last a new and heavier frame member is installed. The owner is notified that his truck is ready. He calls for same, and much to his astonishment is presented with a bill of from $50 to $100, with the natural result that he goes "up in the air" so to speak. "I thought the guarantee covered

this," he acidly remarks. "You admitted that the part was defective," "but," says the agent, "this bill is for installing the part, we havn't charged you a cent for the side frame member."

Is this customer satisfied? Has he been treated right? Just here is the joker in the manufacturer's guarantee. We maintain that when a part is acknowledged to be defective and has to be replaced, necessitating considerable work and expense, it is up to the manufacturer to pay for this work. It certainly ought not to come out of the owner. Just as surely it should not come out of the agent or dealer. The one responsible for the delay and expense is the manufacturer who introduced the defective material or workmanship into the vehicle, and when he admits that the part is defective in either workmanship or material, he should shoulder the burden of replacing it without any expense whatever to the user.

Rigid inspection of both workmanship and material will to a large extent prevent such unfortunate occurrences. Of course occasional cases of defective material will occur in spite of every precaution, but these are so few and far between that the manufacturer could easily afford the entire expense of putting the truck back into running condition. He has no right to shift any part of this cost upon the unfortunate who happened to buy his defective product.

1915 COMMERCIAL CAR ANALYSIS

In this issue there is an analysis or digest of the gasoline commercial car specifications for 1915, taken from the specifications in the Buyers' Information Review. It shows the average and prevailing practice for the different models, and should prove particularly interesting to designers, dealers, salesmen and prospective buyers. In the February issue we will publish a similar analysis of the electric commercial cars for 1915. This is in addition to the Buyers' Information Review.

HOW THE MANUFACTURER CAN ASSIST THE DEALER

THERE are numerous ways in which manufacturers are assisting dealers throughout the country. Much depends upon the number of dealers and the extent of the territory. Some makers even offer to analyze the list of prospects in the dealer's immediate territory and catalogue same according to their line of business. Some go so far as to attempt to send a series of follow-up letters to these prospects.

Nearly all run more or less general advertising campaigns in the trade papers and national mediums. A few offer to pay for a set number of advertisements during the year in local papers, or to share the expense for such advertising.

The analysis of the prospect's business, and reducing costs to legible figures, is one of the duties of the better class of salesmen. Even into this field certain manufacturers have attempted to go, in their effort to assist the dealer. One progressive manufacturer has now gone a step further, and proposes to maintain a school for his dealers and salesmen, in which the special arguments to be used in approaching any particular class of prospective buyer will be taught.

Steel and Rubber Markets

Large Increase of Steel Orders

The December steel orders show 80 per cent. of mill capacity, while the shipments were approximately 36½ per cent. of capacity. Unfilled orders on December 31st were 3,836,643 tons. Quotations on January 11th were:

STEEL PRODUCTS PRICES

Bessemer Steel, per ton, mill	18 50 a19 00
Open hearth, per ton, mill	18 50 a19 00
Sheet bars, per ton	19 00 a20 00
Steel bars, soft base, half ex-tidewater	1 21 a 1 26

The above prices are at tidewater in carloads and larger lots. For quantities less than 2000 lbs., but not under 1000 lbs., $2.00 per ton additional is charged, and less than 1000 lbs., $8.00 per ton additional.

SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots $2.00 per ton higher.

Gauge—	Black.	Galvanized.	Gauge—	Black.	Galvanized.
Nos. 22 & 24	1 60	2 30	Nos. 25 & 26	1 65	2 40
No. 27	1 70	2 60	No. 28	1 75	2 75
No. 29	1 80	2 80	No. 30	1 85	3 05

IRON AND STEEL AT PITTSBURGH

Bessemer iron	14 70 a ....
Bessemer steel, f. o. b. Pittsburgh	18 50 a19 00
Steel bars	1 00 a 1 05
Skelp, grooved steel	1 10 a 1 15
Skelp, grooved iron	1 50 a ....
Ferro-manganese (80 per cent.), seaboard	68 00 a ....
Steel, melting scrap	11 25 a11 50
Black sheets, 28-gauge	1 75 a 1 80
Galvanized sheets, 28-gauge	2 75 a 2 80
Blue annealed, 10-gauge	1 30 a 1 35

Crude Rubber Quiet

No new developments have taken place in the local market during the past month. Little interest is being taken in the market by manufacturers and trading is quiet. It is contended by some in the trade that no great quantity of plantation rubber is likely to be received here from London before March, though others expect some to arrive some time this month. Quotations on January 11th were:

Up-River—	
Fine	67 a 68
Coarse	52 a 54
Island—	
Fine	67 a 68
Coarse	35 a 36
Cameta	37 a 38
Caucho Ball—	
Upper	58 a ..
Lower	Nominal
Centrals—	
Corinto	50 a ..
Esmeralda	48 a ..
Guatemala, slabs	46 a ..
Mexican—	
Scrap	48 a 49
Strips and scrap	47 a 48
Guayule	.. a ..
Balata—	
Short	50 a 51
Ciudad—	
B'k	.. a ..
Trinidad—	
B'k	Nominal
Africans—	
Massai, red	.. a ..
Red C'go	Nominal
B'k C'go	.. a ..
Soudan—	
Niggers	Nominal
Gambia, prime	.. a ..
East India—	
Smk. sh'ts	70 a 78
Ceylon—	
Bls & sheets	66 a 68
Pale crepe	65 a 67
Pontianac—	
P'me plantation	.. a ..
Palembang	.. a ..

DOMESTIC SCRAP RUBBER

Boots and shoes	7¾ a 8
Tires—	
Automobile	5 a ..
Bicycle, pneumatic	3 a 3¼
Wagon and carriage, solid	5 a ..

Don't devote fifty per cent of your time trying to hit upon "something new." It pays best to perfect what you have. There are still a few folks left who prefer a *truck* to an *experiment*.

The CCJ leads in circulation, advertising and prestige

The Use of Trailers Increasing

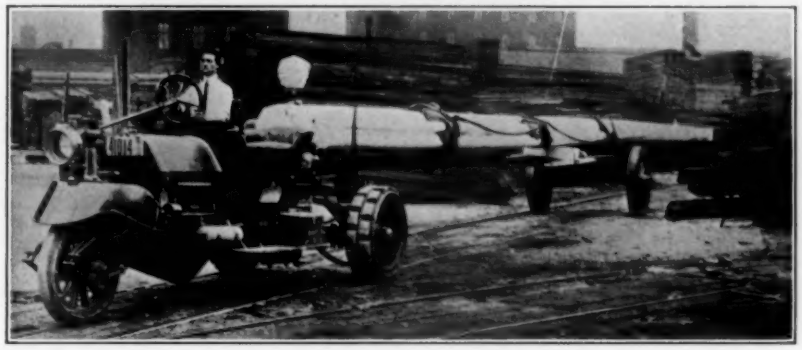
With Properly Designed Equipment They Can Be Made to Pay Handsome Profits Manufacturers of Trucks Discourage Their Use With Standard Chassis

By E. S. FOLJAMBE

(*Continued from our December issue, page 15*)

The Knox tractor, which is of the three-wheeled type is largely used for lumber hauling. Examples of it are shown in the accompanying illustrations. Long lines of trailers are occasionally used. The Couple Gear Company have also recently had a three-wheeled tractor, the front wheel of which is motor driven. As high as five trailers are sometimes handled where the trailers are arranged to automatically follow, in which case double right angle turns can be made. From 2000 to 7000 ft. of lumber can be carried easily at one time. Automatic couplers are also provided, these being somewhat similar to those on a railroad car. A bar enters the funnel shaped opening which guides it into position, so that it is automatically locked.

Army Wagons to Trailers
Forward trailer jacked up, freeing the tractor



Carrying Poles by Trailer
Method of carrying telegraph poles by aid of a two-wheeled trailer

These trains make from 4 to 10 m.p.h., according to the loads and grades and are capable of 15 m.p.h. light, if this is desirable.

The George W. Gale Lumber Company, of Cambridge, Mass., has had a successful use of a combination short wheelbase truck and steel tired trailer of Couple Gear make. They say as follows, in regard to the equipment:

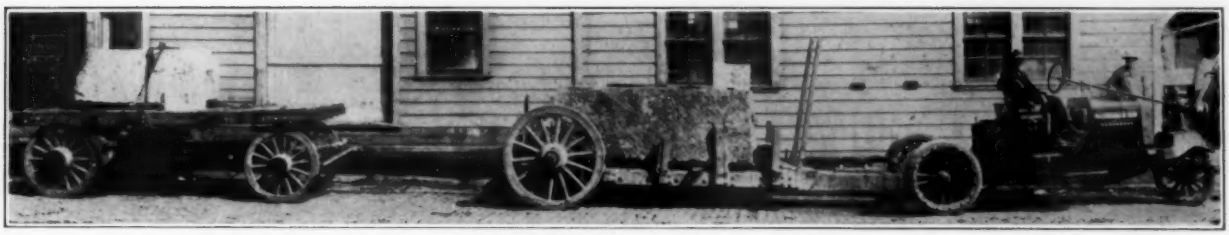
"The trailer being one of our regular wagons, is moved around the yards with horses. In jacking up the loaded wagon we use an ordinary 10-ton Norton jack placed under the perch. This lifts the load off the rocker plate and allows the front axle to be drawn away. It is a very simple operation. The writer timed our boys the other day and they were just 4 minutes shifting from empty trailer to the loaded one and getting away.

"Representatives from the United States Government were here the other day and timed the operation of shifting the batteries and trailers, and the boys were exactly 11 minutes from the time the truck came in the yard and was taken away with a fresh battery and a loaded trailer, but we are of the opinion that they hustled a little. Our truck is doing the work of four two-horse teams."

A year's experience shows the following results: A single horse team in this service costs practically $1920; the power driven outfit as taken from the bookkeeper's record, $3574. The latter is doing the work of four two-horse teams, therefore the horse cost of doing this would

Knox Army Train
Photos showing the short turning radius of the Knox tractor train. Note the guiding wheel touching the rear of the train

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?



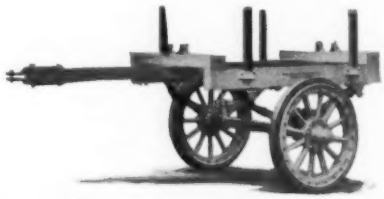
Ordinary Wagons as Trailers

If the speed is reduced sufficiently, ordinary wagons can be used as trailers

be $7680, or a saving of $4106. This single truck carried 7200 tons a total distance of 10,800 miles as against 1050 tons, and 3000 miles as the average work of a two-horse team. This is even better than the equivalent of the work of four two-horse teams. More trucks of the same make have been installed in this service.

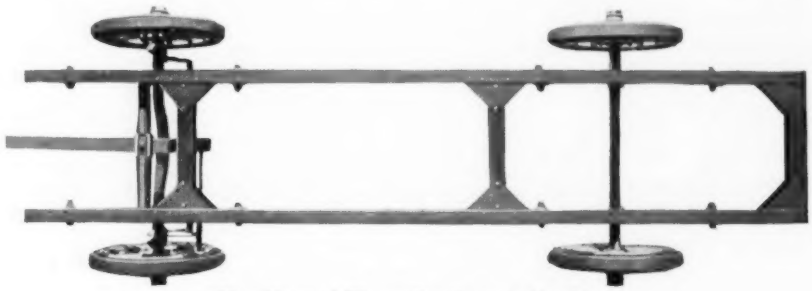
The Mercury Manufacturing Company, of Chicago, has recently placed on the market a three-wheeled tractor of extremely short turning radius, known as the Bulley tractor. This was described in our November issue, together with the use of a train of small two-wheeled trailers as used in the Chicago stockyards. These three-wheeled trailers are chained together, fully a dozen of them being trailed at once. It is claimed that they track so perfectly that double right angle turns can be made in the yards between the pens without difficulty. These alleys are but 12 ft. wide, and with a dozen trailers, the middle of the train is running at right angles to the front and rear trailers which are in different alleys but running parallel. The third wheel of these trailers is of axis type.

Not only in the field of heavy hauling are trailers being employed, but there is another class of service such as very light weight, bulky material, which has to be carried to or from the work or for deliveries. Occasionally, trailers are used for carrying such materials from building to building in factories, or from one group of buildings to another belonging to the same company, but separted by several city blocks. The Detroit Trailer Company manufactures various sized trailers all the way from little fellows of 1200 lbs. capacity, to be attached to the Ford or other small pleasure cars, up to five-ton trailers. We herewith illustrate a special pole and lumber trailer, which is made in sizes from 2 to 5 tons capacity. This is fitted with rubber tires. The larger trailers are of the four-wheeled type with 6 in. I-beam steel frames of from 12 to 20 ft. in length. Wheels are of heavy artillery type with roller bearings, with 36 by 6 in. solid rubber tires. On the five-ton models, both the axles are 2¼ by 3¼ in. rectangular section, tread standard. The plan view of a three-ton chassis is herewith shown. It shows the drawbars and steering gear.



Special Pole and Lumber Detroit Trailer

These two-wheelers are made in sizes from two to five tons, and are fitted with rubber tires, as shown.



Plan View of Three-Ton Detroit Trailer

This shows the heavy frame construction, well gusseted at the corners, drawbar and steering gear. These vehicles steer at one end only

The Troy Wagon Works trailer chassis is also illustrated, showing the very massive construction. This also clearly shows the drawbar and its connection to the steering gear by means of an arm working in a slot. A bottom view of the chassis is also shown, which further illustrates the construction. Another view shows a typical dumping body on one of the Troy chasses.

The Troy Wagon Works Company, conducted a series of tests in charge of Morgan Cilley, their consulting engineer, as to the efficiency of motor trucks with trailers. The results of these tests were given and illustrations shown in our issue of April, 1913, page 18. This reference is given so that anyone interested may go into further details. Briefly, it was shown for short hauls the horse-drawn outfits are cheaper than the motor, the lost time of the latter cutting down delivery and reducing the average speed. A combination of high speed and capacity must compensate for the increased cost of the motor truck, therefore, increase of capacity without a corresponding decrease of speed tends toward a solution of the problem. Makeshifts such a dump wagons with stub tongues, etc., were found to be impractical at the usual speed of motor trucks. In conclusion, they state as follows: "These tests demonstrated the ability of a three-ton motor truck to maintain a sustained draught of over 3000 lbs. and prove that on ordinary pavements at average speeds,

One Motor-Wheel Tractor Hauling Train of Three Trailers, Carrying a Total of 3708 Feet of Lumber

Note the automatic steering, as shown by the rear wheels of the third trailer, which is making the turn. This train is controlled by one man; the photograph shows a passenger, but he can be dispensed with to advantage. This couple-gear tractor has only the front wheel driven

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

Troy Trailers

Special dumping body on Troy trailer chassis. Chassis, showing the massive construction. At the farther end the connection to the steering gear is shown. These vehicles are fitted with solid tires but can be had with pneumatics if desired.

and on usual grades, the draught required by one trailer with a five-ton load ranges from 400 to 2000 lbs., and from 750 to 3000 lbs. for two trailers loaded with 5 tons each, an average of from 50 to 200 lbs. per ton." That the trailer most nearly solves the problem of street and highway transportation than anything heretofore offered, and the vital importance of reducing lost time to a minimum is shown by these tests.

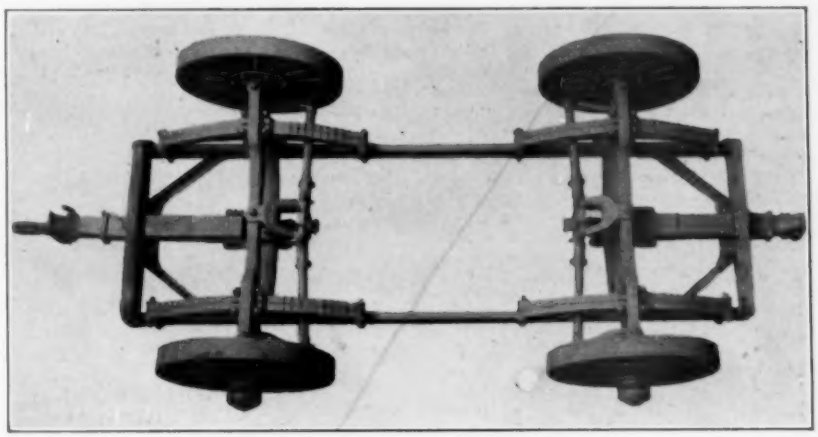
Backing Tests

A demonstration of rigidity of a trailer for backing and its flexibility in making curves and turns was made. The three trailers were loaded with 4 tons each, with the forward drawbars locked, the rear drawbars free, and one man steering the trailer. The train was backed 400 ft. and around a 90 degree corner, and could have been backed into a desired position, showing that while rigid enough to prevent buckling, the train was flexible enough to be steered around curves and turns. This test was on a brick pavement. The same test was then successfully made on a macadam street with the trailers loaded with 5 tons each.

To sum up this matter, it is the writer's opinion, that as motor haulage becomes more general the use of specially built devices to be used as tractors or trailers will also increase, and that trucks will be placed on the market for both general purposes, and to be used as tractors, special designs permitting this use. This publication will be glad to hear from manufacturers who have made tests and will welcome information from users as to their practical experience on the subject of trailers.

Notable Use of Trailers on Short Haul in Pittsburgh

It is seldom that a case is found of the use of trailers on very short hauls and through the most congested districts of a city, but this is the situation with regard to a most novel piece of engineering work on the part of James L. Stuart, constructing engineer, of Pittsburgh, Pa.



Under Side of Troy Chassis

Attention is called to the rugged construction throughout. The vehicle is double-ended, with wheels at both ends steering

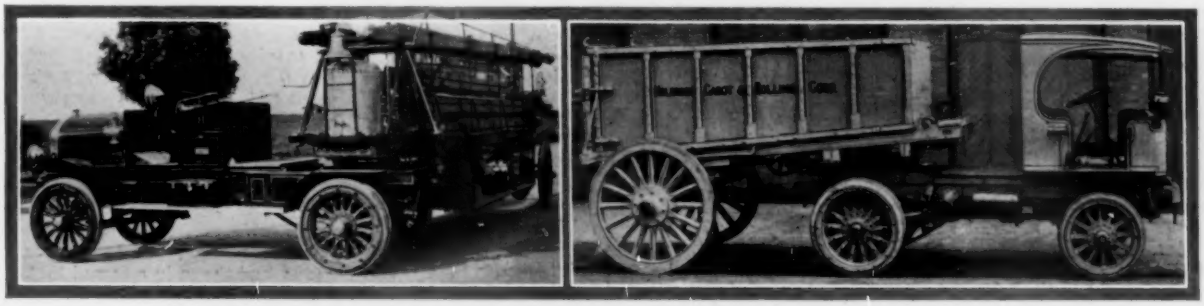
The haul in question was about five-eighths of a mile down grade. On the up grade the trucks were empty. The material carried was clay, gravel and rock taken from the excavations for the large William Penn Hotel, which is now being erected in that city. This material had to be taken to the Allegheny River and thence by scows to Brunot Island.

It was desirable to move it at the greatest possible speed. To facilitate the work the company designed some special trailers which were made for them by Weir & Sons, of Pittsburgh. These were each of 5 tons capacity and fitted with solid tires, as shown in the accompanying group illustrations. The trailers were fitted with separate brakes, but no special steering apparatus. A man was required on each trailer to operate the brakes. Special bottom dump bodies provided means of quickly disposing of the load from the trailer through a hole in a special platform.

Five-Ton Trucks Haul Nine Tons

The trucks used in connection with this work were five-ton Pierce-Arrows, there being three of these, each provided with a 7000-lb. capacity trailer, the weight of the trailer being 3250 lbs. Each truck weighs 9100 lbs., which, together with the trailer weight, makes a dead load of 12,350 lbs., to which must be added 300 lbs. for the men, thus the total weight moved, including the pay load of 10,000 lbs. on the truck and 7000 lbs. on the trailer, was 29,650 lbs., about 14½ tons.

To facilitate the rapid disposal of the load from the trucks to the barge, and on account of congested quarters for handling



Examples of Short Wheelbase Trucks With Two-Wheeled Trailers on Steel Tires

The dumping body is pivoted on a fifth wheel on a Garford chassis. Such vehicles are largely used by contractors for hauling trap rock, stone, sand, etc. The fire apparatus shown is a three-ton hook-and-ladder on a Mack. This piece of equipment is all rubber tired. There has been a notable increase this year in the use of the trailer idea in connection with fire apparatus.

The CCJ has most readers because it gives most information

tractors, a turntable long enough to accommodate the truck and trailer, as shown in the accompanying photograph, was constructed at the dump. The truck and trailer were driven directly onto this and dumped the loads through openings into large wooden containers of 5 yards capacity each, which were picked up by a derrick and swung onto the barge in rows of five each, then the barge was pulled forward the length of the boxes by a winch on the shore and another row placed.

At the loading point industrial engines with small trains carried the dirt across the large excavation to a pile at the side where a chain conveyor lifted it to large dumping containers, from which it shot directly from overhead into the truck and trailer. The round trip, including the loading and dumping and of turning the truck and trailer around on the turntable, consumed but 15 minutes.

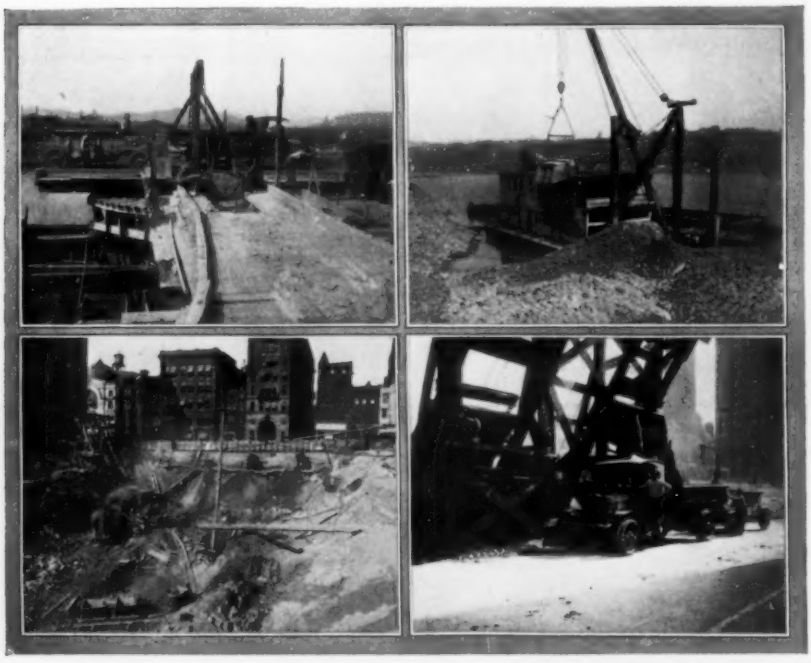
The work was continued day and night, the three trucks and trailers averaging 400 yards each in 24 hours.

The use of the trailers was an experiment on the part of Mr. Stuart. The trailers were found somewhat of a nuisance to handle, and trouble was had with the kingpins, there not being sufficient vertical play. The night crew discarded the trailers altogether and claimed to get out as much work without them as the day crew did with them. This is partly accounted for by the fact that this haul was through the heart of the city and at night there were no delays due to traffic. In connection with this work Mr. Stuart said:

Ten-Ton Milk Tractor

This equipment consists of a standard Mack five-ton tractor with a trailer mounted on chassis by means of a specially designed fifth wheel. Rear wheels on the trailer are 47 in. high, with 10 in. steel tires. The body carries 168 forty-six quart cans of milk, weighing 125 lbs. each, there being a deck in the body, 28 in. high from the floor. This truck is geared to run at about ten miles an hour, and is used by E. W. Woolman, of Philadelphia, Pa.

"From our experience and under the present conditions of the job, we would prefer to eliminate the trailers and use trucks only, as we found considerable difficulty in dumping the trailers when they were dumped any place other than the turntable arrangement. Our trailers were designed specially for the turntable arrangement and later we began hauling this material to the dump, and as the trailer has a bottom dump we had considerable trouble in getting the auto to pull the trailer out of the spoil-bank or dump after the gates were let down. Our reason for giving up the turntable dump at the river was due to the heavy fogs which begin early in this season of the year which ties up the river traffic."



Moving Twelve Hundred Cubic Yards a Day by Three Trucks With Trailers

The above views show the various phases of the short haul made by James L. Stuart Company, of Pittsburgh, with five-ton Pierce-Arrow trucks, and five-ton trailers. In the lower left is shown the excavation for a large building, the material being carried to overhead loading buckets above the street level, by an endless chain conveyor. In the lower right is shown the dumping overhead loading device, fed by the conveyor, in the act of throwing its contents into the truck. In the upper left is shown the truck and trailer on a specially built turntable at the dump, so that no backing is required, the loads being discharged through a hole directly into large wooden boxes, which are handled, as shown in the upper right hand photograph, by a derrick. Much of this material was loaded directly onto the scows, box and all.

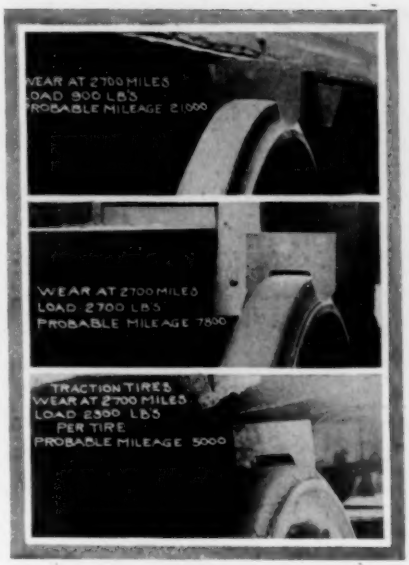
Trailers Used for Tire Test

The novel tests which are being conducted by the Goodyear Tire & Rubber Company, of Akron, Ohio, as to the carrying capacity of tires, bring out some interesting points in connection with trailers. For this test a train consisting of a three and a half ton G. M. C. truck 2 years old but overhauled, and two five-ton Troy trailers, each carrying loads of pig iron, are being used. The engine is 50 h.p. 5x5. Trailers are used in order that different loads might be placed on the tires and the tires run under exactly the same conditions, that is the same road mileage and speed. The total weight of the truck and trailers is 30,500 lbs. The trailers are fitted with different sized tires, for instance trailer No. 1 has 36x4 tires on front under 2700 lbs. load, while 36x5 tires under 2850 lbs. are used on the rear. Trailer No. 2 has 36x4 tires all around, but with 1900 lbs. on each front tire, and only 900 lbs. on each of the rear tires. The truck itself has a 36x5 on the right front, and a 36x4 on the left front, each under a load of 2200 lbs. The right rear is 36x4 and the left rear 36x7, each carrying 4580 lbs.

The truck was overhauled and put in good condition before starting, the only change on account of using trailers being that the bevel pinion of the differential was altered to give approximately 10 per cent. more power and an auxiliary tank was connected with the radiator to supply ample cooling water.

The test was begun on August 3rd, the train running from 50 to 60 miles per day around Akron, until August 27th, when the train started across country for Columbus, Dayton and Troy. At the latter place the Troy Wagon Company made drawbar and other tests, and the train returned to Akron on September 15th, where it again made mileage until October 1st. It then left for Detroit, cross country returning to Akron on October 21st, where it again made mileage until November 18th, when day and

The CCJ has most advertisers because it gives them biggest returns



Tire Wear at Twenty-Seven Hundred Miles

The two upper photos show tire wear varying according to load, while the bottom picture shows the increased wear on the driving tires of the tractor.

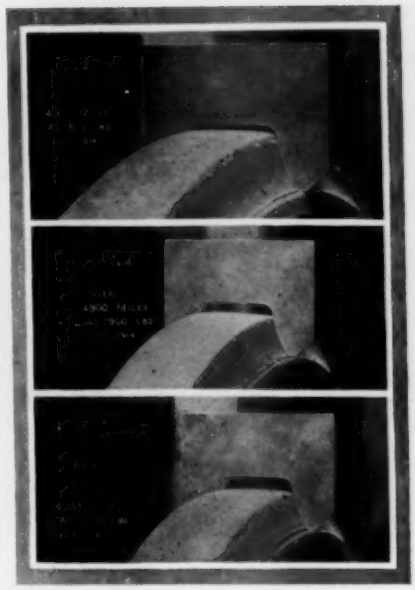
night running began. The latest report after 3750 miles, there had been no repairs which could be attributed to the additional duty demanded from hauling trailers. The engine bearings were taken up once since the test started, but no repairs were found necessary aside from regrinding the valves, fixing a belt, relining a brake, and a minor repair on a cutout valve stem. J. E. Hale, experimental engineer for the company, in charge of the test reports that there is no apparent abnormal depreciation in the truck chassis.

Climbed Eleven Per Cent Grade

It is interesting to note that the loaded train has climbed 11 and 12 per cent. grades of one-third of a mile in length, but this heats the radiator water to the boiling point. On one occasion the driver stopped in the middle of a 15 per cent. grade on a dirt road and started again going over the top. There is no noticeable distress from running the engine on the low gear, but of course extra cooling water, as mention before, is supplied by the auxiliary tank. In regard to rainy weather, he says, "I tried the train out thoroughly in rain, and found that we can easily handle it on slight hills, and chains make it perfectly safe. The trailers take care of themselves, and will go wherever the truck goes. No men are used on the trailers for their operation, but as the trailers are absolutely noiseless and fitted with solid rubber tires, it is found necessary to keep a man on the rear end as a 'safety first' precaution. A large part of the time the the train has been running without antiskid devices of any kind. It makes from 10 to 12 miles an hour on one-third throttle on level streets."

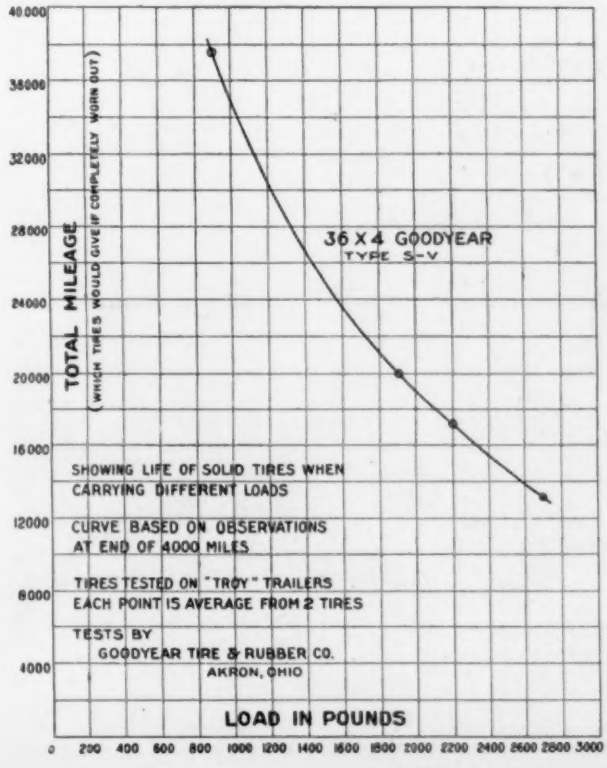
It is instructive to notice the comparative wear on the tires after 2700 miles of running, and the additional wear on the traction tires of the truck, as shown by the gauge test in the accompanying illustration.

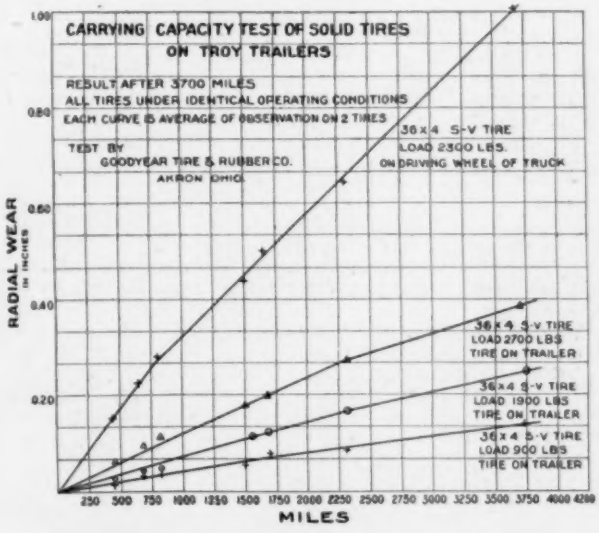
In conclusion, Mr. Hale says: "As to using a truck for hauling trailers, we have demonstrated that it can be done, but we have been careful to get the best drivers, and they have been cautioned to favor the truck as much as possible. It is also evident that a more powerful engine is necessary for work of this kind in hilly country, and the four-wheel drive would certainly be an improvement on account of the increased traction and braking. Undoubtedly, the service imposes more severe stresses



Tire Wear Proportional to Load

These Goodyear tires, run on trailers exactly the same distance, 4900 miles, under exactly the same conditions except load, are a most convincing demonstration of the fact that the wear on a tire is almost exactly in proportion to the load.





Plots Showing Total Mileage Against Load and the Radial Wear Against the Mileage

The plot on the left shows most consistent results, an indication of the accuracy of the test. The curves show that with a given load the wear is almost directly proportional to the mileage. The plot above is especially interesting; showing first that the wear is practically proportional to the mileage, and second, there is much more pronounced wear due to tractive effort and braking on the driving wheels of the truck.

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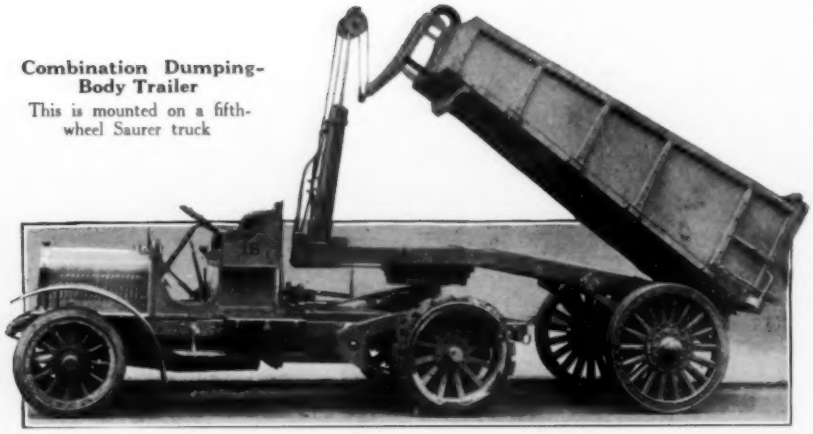


Combination Dumping-Body Trailer
This is mounted on a fifth-wheel Saurer truck

on the chassis, power plant and transmission system especially, so that a strenuous design is desirable. We have had no trouble in handling two trailers, and see no reason why even three or four could not be safely handled on level roads if adequate power and braking were provided. As to the tires, of course the tires on the driving wheels wear out much faster on the tractor due to the increased tractive and braking stresses imposed on them. In general, from the experience already had, I am of the opinion that it is a safe and economical proposition to use an ordinary truck as a tractor, provided it is not too small for the work and the driver is conscientious in driving to give the truck a fair show."

Truck and Trailers in Solid-Tire Test
Truck showed no abnormal depreciation due to the trailers except driving wheel tire wear.

DETROIT'S COMMERCIAL CAR SHOW

The first separate commercial car show of the season is held in Detroit during the week of January 16-23, under the auspices of the Detroit Automobile Dealers' Association. The exhibition will be staged in the first building of the Detroit Lumber Company, the space occupied being 236x110 ft.

Among the exhibitors for the Detroit Truck Show may be seen the Federal, Standard, Packard, Commerce, G. M. C., Signal, Peerless, Pierce-Arrow, Studebaker, Kelly, Denby and Detroit Electric.

Studebaker exhibit consists of a panel body, express body, a combination passenger and baggage car, and a delivery car chassis.

Kelly-Springfield shows a one and a half-ton truck used by the Public Lighting Commission, and a one and a half-ton truck built for the Schroeder Paint & Glass Company. The former has 144-in. wheelbase, with 12-ft. loading space on the frame back of the driver's seat. It is equipped with an express body 13 ft. long x 5 ft. 6 in. wide, with 24-in. panel sides and 2-ft. tail gate The chassis is painted cream color, and the body and cab are coach blue with gold lettering. The second car also has a 144-in wheelbase, with 12 ft. x 6 ft. loading space, and the gates are 4½ ft. high, painted orange, with gold letters. Two other models shown are a one and a half-ton panel body for the Grand Furniture Company, with a 13 ft. x 6 ft. 2 in. body, chassis in maroon, and body and cab in royal blue with gold letters and a 15x6 ft. stake body on a 15-ft. wheelbase for the Roehl Storage Company. A one-ton chassis is shown, mounted on a three and a half ton chassis. All these trucks have Polack tires and Sewell cushion wheels.

Federal displays a two-ton worm drive and a chain drive model, and a worm drive chassis.

Standard shows a three-ton worm drive, a five-ton heavy duty and a four-ton truck with hydraulic dump, steel body for contractors, etc.

Pierce-Arrow exhibits a five-ton chassis.

Signal shows worm drive chasses in one and one and a half-ton capacities, and a special body for a wholesale provision merchant.

Anderson shows a two-ton chassis and a two-ton truck with platform body.

G. M. C. displays 1500-lb. two-ton and three and a half-ton gasoline trucks, and 1000-lb. and three-ton electrics.

Denby shows for the first time one and a half and two-ton trucks, models D and E, respectively. Also a 1500-lb. model with an electric light, adjustable to any angle, near the driver's seat, for finding street numbers, etc. It also has a dome light supplied by battery and generator. One truck has side doors and horizontal rolling curtains, giving the driver ample protection for weather and making ingress and egress very easy.

LIST OF TRUCK EXHIBITORS

Thompson Auto Co., Federal, Commerce Standard.
Anderson Elec. Car Co., Detroit Electric.
Buick Motor Co., Buick.
Neumann-Lane Co., Pierce-Arrow.
Republic Motor Truck Co., Republic.
J. C. Wilson Co., Wilson Truck.
Standard Auto Co., Packard.
Kelly-Springfield Truck Co., Kelly-Springfield.
General Motors Truck Co., G M C.
Studebaker Corporation, Studebaker.
Thos. F. Cowhey, Garford and Willys Utility.
Denby Motor Truck Co., Denby.
Dominion Motor Truck Co., Dominion.
Moritz-Mullin Co., Signal.
International Harvester Co., International Trucks.
Columbia Buggy Co.
M. A. Young, Reo.
Siegel-Zeckendorf Co., Peerless.

THE NEW FOUR-WHEELED KNOX TRACTOR

The Knox Motors Company, Springfield, Mass., has just brought out a new four-wheeled tractor, known as the model 35, having a four-cylinder engine, cast in pairs with overhead valves. Drive is by side chains. It has a wheelbase of 108 in. and weighs 7500 lbs. It is fitted with a Bijur electric starter, electric headlights and tail light with an extension for the tail light of the trailer and is also equipped with an electric hoist. Further details will be given in an early issue.

George Parsons, of Detroit, has been forced by government action on the part of Canada to use motor delivery in his work as mail contractor. Canada has refused to allow him to bring his horse into the Dominion on account of fear of the foot and mouth disease, and he has been obliged to hire a motor wagon.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

On the other side of this leaf will be found the key to the abbreviations used in the

Buyers' Information Commercial Car Review

While consulting the Review, turn this leaf out so that it extends beyond the book, it will then be convenient for reference, no matter how many pages you turn to.

Indexes arranged alphabetically and according to price are on pages 36, 36a and 36b.

KEY OF ABBREVIATIONS

USED IN THE

Buyers' Information Commercial Car Review

Chassis Weight: Given in pounds and includes weight of chassis only.

Price: In the table the prices are for chassis only, unless marked with an asterisk (*), in which case they include both chassis and body. In the captions, the prices are for the car complete with body as shown in the illustration, unless otherwise stated.

Bodies: Gives the styles of bodies carried as standard stock. Bodies other than those indicated can usually be had on order. Prices of these bodies, where obtainable, are given in the captions under the illustrations. P, panel; S, stake; F, Flareboard; C, canopy top; E, express; SS, screen side; D, power dump; H, hand dump.

Wheelbase: In inches—O, optional.

Load Platform Height: In inches.

Maximum Speed: In miles per hour—O, optional.

Horse Power: Calculated by the S. A. E. formula, 4-cycle H. P. $= \frac{D^2 N}{2.5}$; 2-cycle H. P. $= \frac{D^2 N}{1.515}$; D = bore in inches, N = number of cylinders. Motors are 4-cycle unless horse power is preceded by an asterisk (*), which indicates 2-cycle.

Cylinders Cast: S, singly; P, pairs; B, en bloc.

Cooling: T, thermo-syphon; G, gear pump; C, centrifugal pump; A, air; W, water.

Radiator: H, honeycomb; T, tubular; C, cellular; V, vertical.

Carburetor: B, Breeze; F, Flechter; FR, French; H, Holley; K, Kingston; MU, Muir; MY, Mayer; O, optional; R, Rayfield; SB, Stromberg; SL, Schebler; SP, special; SU, S. U.; Z, Zenith.

Lubrication: S, splash; F, force-feed; G, gravity; M, mixed with fuel.

Ignition: A, Atwater Kent; B, Bosch; BL, Berling; BR, Briggs; C, Connecticut; E, Eisemann; H, Heinze; M, Mea; SD, Splitdorf; W, Western Electric; WS, Westinghouse.

Spark Plug Size: S, S.A.E.; ½, ½ in. pipe; M, Metric.

Clutch: B, band; C, cone; D, disc; S, special.

Drive: B, bevel gear; C, chain; W, worm; I, internal gear; V, belt; R, roller; S, shaft; SP, spur; O, optional.

Transmission: S, selective; P, progressive; L, planetary; F, friction; H, hydraulic; E, electric.

Tires: Solid unless otherwise indicated—*, pneumatic; D, dual; T, triple; †, cushion; S, steel; O, optional.

Steering Wheel: R, right; L, left; C, center; O, optional.

Control Levers: R, right, L, left; C, center; O, optional.

Engine Starter: E, electric; O, optional; X, extra.

ADDITIONAL ABBREVIATIONS USED ON ELECTRICS

Motor: S, series; SH, shunt.

Battery: EX, Exide; E, Edison; GV, G. V.; P, Philadelphia.

Controller: D, drum.

ADDITIONAL ABBREVIATIONS USED ON STEAM CARS

Engine Mounted: H, horizontal.

Engine Type: N, non-condensing.

Boiler Type: FT, fire-tube.

Boiler Location: H, under hood.

Fuel: K, kerosene.

Indexes arranged alphabetically and according to price, are on pages 36, 36a and 36b.

Buyers' Information Commercial Car Review

(*Eastern Section*)

On the following pages is given a complete review of the Commercial Car Models which will be manufactured for the coming season by Eastern American Manufacturers.

See Complete Indexes on Pages 36, 36a and 36b

THIS is the first or Eastern Section of the Review, and includes cars manufactured in the following States: Connecticut, Kentucky, Maryland, Massachusetts, New York, New Jersey, North Carolina, Ohio and Pennsylvania.

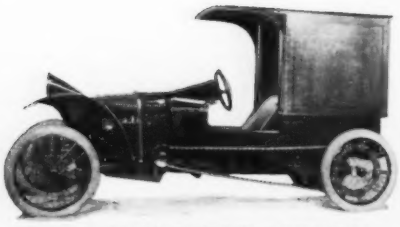
The second or Western Section will be issued February 15th, and will contain a review of cars made in the following States: California, Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Oregon, Texas, Washington and Wisconsin.

The data given in this Review was supplied direct by the makers, and is as correct as can be obtained. Any omissions or inaccuracies which occur are due to imperfect information given us by makers.

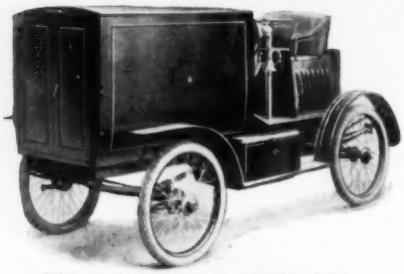
Key to Abbreviations will be found on the leaf attached to this page; when this is opened out it will be found very convenient to refer to, no matter which pages of the Review are consulted. Indexes will be found on pages 36, 36a and 36b.

Criticisms and Suggestions on this Buyers' Information Review are invited. We want to know whether it meets requirements and how it can be made better, if possible.

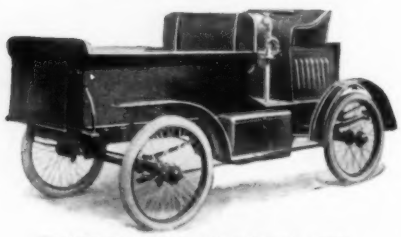
Horse-Power Formula.---All horse powers are calculated by the S. A. E. formula: H. P. $=\frac{D^2N}{2.5}$; 2-cycle engines by the modified formula, H. P. $=\frac{D^2N}{1.515}$ where D = bore in inches and N = number of cylinders.



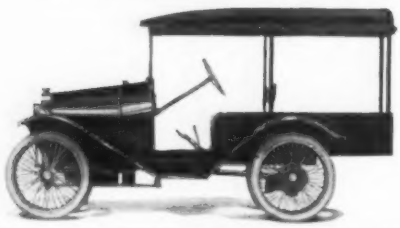
Burrows Model D, 500-lb. Panel, $295.



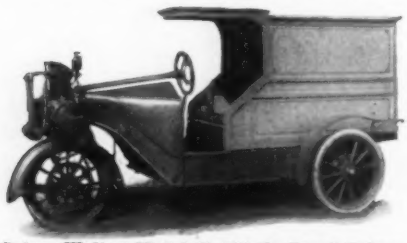
Motokart 500-lb. Box Body, $365.



Motokart 500-lb. Flareboard, $365.



Trumbull Model 15, 500-lb. Canopy Top, $395.



Peters-Walton Model E, 600-lb. Panel Tricar, $375.
Made by Ludlow Auto Engineering Co.

Vim Model F, 1000-lb. Canopy Top, Chassis, $620.
Also Panel, $685.
Made by Touraine Co.

Duryea Model B, 1000-lb. Panel, $675.
Also Canopy Top, $650; Flareboard, $625.

Gabriel Model K, 1000-lb. Panel, $1000.
Also Stake, $1350; Flareboard, $1325.

500 Pound Gasoline Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
			Burrows Cyclecar Co., Ripley, N. Y.									
D	....	295*	P	106	..	..	9	2	3.38	3.91	S	A
			Kearns Motor Truck Co., Beavertown, Pa.									
.....	....	475*	.....	90	..	..	12	4	2.75	4	B	T
			Motokart Co., New York City.									
.....	900	365*	P, F	69	24	30	11	2	3.63	4	S	T
			Trumbull Motor Car Co., Bridgeport, Conn.									
15 B	....	....	C	80	..	..	13	4	2.88	4	B	T
			Twombly Car Corp., New York City.									
.....	....	750*	....	100	..	..	16	4	3.13	4	B	T

600 Pound Gasoline Commercial Cars

			Ludlow Auto Engineering Co., Philadelphia, Pa.									
E	650	350	P	82	24	25	9	2	3.31	4	S	A

800 Pound Gasoline Commercial Cars

			Willys-Overland Co., Toledo, O.									
81	2600	895*	P, S, E	106	31	35	26	4	4	4.5	S	T

1000 Pound Gasoline Commercial Cars

			Duryea Laboratories, Philadelphia, Pa.									
B	1250	600	P, F, C	84	32	20	19	2	3.75	3.75	S	A
			Gabriel Auto Co., Cleveland, O.									
K	1800	1200	P, S, F	112	30	30	20	4	3.5	5	B	T
			Touraine Co., Philadelphia, Pa.									
.....	....	620	P, F	96	26	25	15	4	3	4.5	B	T

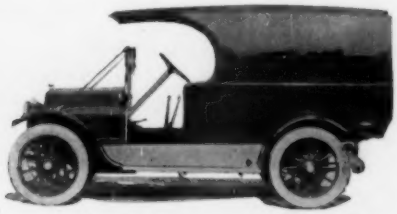
1200 Pound Gasoline Commercial Cars

			Bingham Mfg. Co., Cleveland, O.									
.....	....	....	P	..	..	..	20	4	3.5	5	B	T

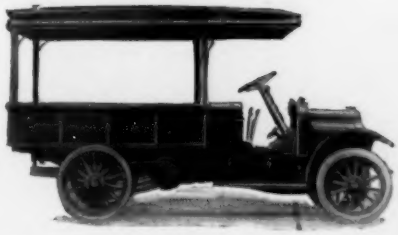
1500 Pound Gasoline Commercial Cars

			Atterbury Motor Car Co., Buffalo, N. Y.									
A-W	3210	1800	.....	118	39	23	20	4	3.5	5	B	T
			Anglaize Motor Car Co., New Bremen, O.									
H	2500	950	P, S, F	100	30	15	*36	2	5.25	4	S	T
			Brockway Motor Truck Co., Cortland, N. Y.									
G	2700	1305	P, S, F	112	32	18	20	4	3.5	5	B	T
			Chase Motor Truck Co., Syracuse, N. Y.									
T	3200	1500	P, S, F	135	31	20	20	4	3.5	5	B	C
			Croce Auto Works, Asbury Park, N. J.									
A	2800	1600	P, S, F	108	30	25	23	4	3.75	5	B	W
			Gabriel Auto Co., Cleveland, O.									
H	2900	1600	P, S, F	126	30	30	23	4	3.75	5.25	B	C
			Gramm-Bernstein Co., Lima, O.									
.....	....	1350	.....	118	..	20	20	4	3.5	5	B	T
			Lippard-Stewart Motor Car Co., Buffalo, N. Y.									
B	2600	1650	P, S, F	115	..	25	23	4	3.75	5.25	B	C
C	2600	1650	P, S, F	125	..	25	23	4	3.75	5.25	B	C
D	2600	1650	P, S, F	135	..	25	23	4	3.75	5.25	B	C
BW	2700	1750	P, S, F	115	..	25	23	4	3.75	5.25	B	C
CW	2700	1750	P, S, F	125	..	25	23	4	3.75	5.25	B	C
DW	2700	1750	P, S, F	135	..	25	23	4	3.75	5.25	B	C
			Sanford Motor Truck Co., Syracuse, N. Y.									
O	2800	1290	F	120	32	18	20	4	3.5	5.13	B	T
			Stewart Motor Corp., Buffalo, N. Y.									
O	3100	1500	P, S, F, SS	125	34	40	20	4	3.5	5.5	B	T
Q	3100	1500	P, S, F, SS	135	34	40	20	4	3.5	5.5	B	T
			Tiffin Wagon Co., Tiffin, O.									
A	2500	1600	S, F	112	30	18	23	4	3.75	4.5	B	T

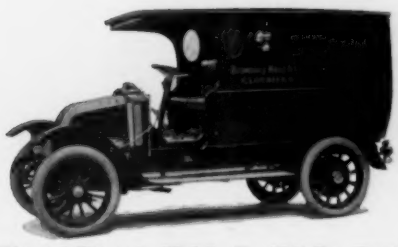
Vim De Luxe, 1000-lb. Panel, Chassis, $620.
Made by Touraine Co.



Overland Model 81, 800-lb. Panel, $895.
Also Open Express, $850.
Made by Willys-Overland Co.



Willys Utility 1500-lb. Covered Express, $1500.
Made by Gramm Motor Truck Company.



Lippard-Stewart Model B, 1500-lb. Panel Chassis, $1650.

Auglaize Model H, 1500-lb. Flareboard, $995.
Also Panel $995; Stake, $990.

500 Pound Gasoline Commercial Cars

Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
					Burrows Cyclecar Co., Ripley, N. Y.									
..	SL	SF	A	M	..	V	F	4	28x3*	28x3*	R	R	..	..
					Kearns Motor Truck Co., Beavertown, Pa.									
H	MY	S	BL	S	C	B	S	3	28x3*	28x3*	L	C	..	E
					Motokart Co., New York City.									
H	..	SG	..	S	..	..	F	..	26x2½*	26x2½*	L	..	60	..
					Trumbull Motor Car Co., Bridgeport, Conn.									
V	O	SF	SD	¼	C	B	S	3	28x3*	28x3*	L	C	..	E
					Twombly Car Corp., New York City.									
H	..	..	..	S	C	B	S	3	30x3*	30x3*	C	L	..	..

600 Pound Gasoline Commercial Cars

					Ludlow Auto Engineering Co., Philadelphia, Pa.									
..	FR	S	..	½	..	C	H	.	28x3*	28x3*	C	C	85	..

800 Pound Gasoline Commercial Cars

					Willys-Overland Co., Toledo, O.									
C	SL	S	SD	S	C	B	S	3	33x4*	33x4*	L	C	65	E

1000 Pound Gasoline Commercial Cars

					Duryea Laboratories, Philadelphia, Pa.									
..	K	M	B	½	.	R	..	2	34x1⅝	42x1¾	L	C	..	..
					Gabriel Auto Co., Cleveland, O.									
H	SB	SF	B	S	C	B	S	3	32x4*	32x4*	L	C	65	..
					Touraine Co., Philadelphia, Pa.									
T	..	S	A	S	C	B	S	3	30x3½*	30x3½*	L	C	64	..

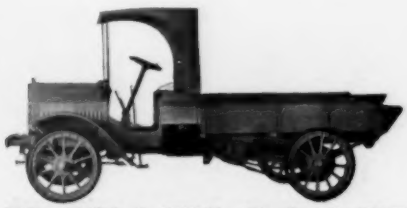
1200 Pound Gasoline Commercial Cars

					Bingham Mfg. Co., Cleveland, O.									
..	..	..	E	..	..	..	F	.	.....	.....	..	..	..	..

1500 Pound Gasoline Commercial Cars

					Atterbury Motor Car Co., Buffalo, N. Y.									
H	SB	SF	B	S	D	W	S	3	35x4½*	35x4½*	L	C	70	..
					Auglaize Motor Car Co., New Bremen, O.									
H	SL	SF	R	¼	D	C	L	2	36x2½	36x3	R	R	70	..
					Brockway Motor Truck Co., Cortland, N. Y.									
V	SL	SF	B	S	C	C	S	2	2½	3	L	C	70	..
					Chase Motor Truck Co., Syracuse, N. Y.									
T	H	SF	B	S	D	W	S	3	36x2½	36x3½	L	C	82	..
					Croce Auto Works, Asbury Park, N. J.									
T	R	F	B	S	C	B	S	3	*	*	R	R	50	..
					Gabriel Auto Co., Cleveland, O.									
H	SB	SF	B	S	C	B	S	3	34x4½*	34x4½*	L	C	65	..
					Gramm-Bernstein Co., Lima, O.									
..	..	SF	..	..	D	W	IC	3	34x3	34x4	L	C	..	X
					Lippard-Stewart Motor Car Co., Buffalo, N. Y.									
V	O	S	E	S	C	B	S	3	35x4½*	35x4½*	L	C	75	..
V	O	S	E	S	C	B	S	3	35x4½*	35x4½*	L	C	75	..
V	O	S	E	S	C	B	S	3	35x4½*	35x4½*	L	C	75	..
V	O	S	E	S	C	W	S	3	35x4½*	35x4½*	L	C	75	..
V	O	S	E	S	C	W	S	3	35x4½*	35x4½*	L	C	75	..
V	O	S	E	S	C	W	S	3	35x4½*	35x4½*	L	C	75	..
					Sanford Motor Truck Co., Syracuse, N. Y.									
T	MU	SF	SD	S	D	C	S	3	36x3	36x3½	L	C	60	..
					Stewart Motor Corp., Buffalo, N. Y.									
C	Z	SF	B	M	D	B	S	3	34x4½*	34x4½*	L	C	60	X
C	Z	SF	B	M	D	B	S	3	34x4½*	34x4½*	L	C	60	X
					Tiffin Wagon Co., Tiffin, O.									
V	B	SF	B	S	C	C	S	3	.....	.....	L	C	75	..

Bingham 1200-lb. Panel, $800.



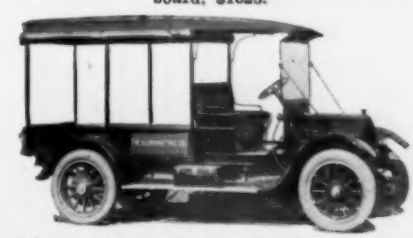
Tiffin Model A, 1500-lb. Flareboard, $1663.
Also Stake, $1722.

Chase Model T, 1500-lb. Canopy Top, $1950.
Also Panel, $2000; Stake, $1700; Flareboard, $1600.

Sanford Model O, 1500-lb. Flareboard, $1350.

Stewart Series 2, 1500-lb. Panel, $1650.
Also Panel, $1700; Stake, $1650; Screenside, $1650; Furniture Van, $1700.

Stewart Series 2, 1500-lb. Covered Flareboard, $1625.

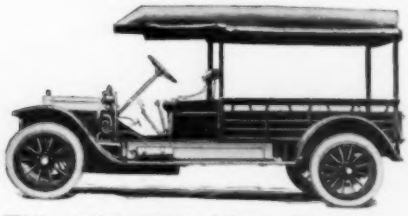


Gabriel Model H, 1500-lb. Canopy Top, Chassis, $1650.
Also Panel, $1800; Stake, $1750; Flareboard, $1725.

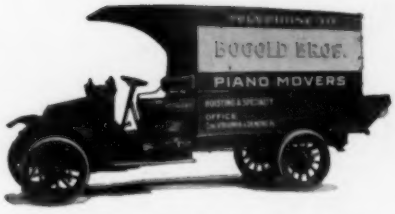
BODY DETAILS OF CARS NOT ILLUSTRATED

Brockway Model G, 1500-lb. Panel, $1500.
Also Stake, $1400; Flareboard, $1350.

Barker Model U, 2000-lb. Flareboard, Chassis, $2000.



White Model GBBE, 1500-lb. Canopy Top, $2250.
Also Panel, $2250.



Lippard-Stewart Model H, 2000-lb. Panel, Chassis, $2000.

1500 Pound Gasoline Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
White Co., Cleveland, O.												
GBBE	2965	2100	P, F	133	31	..	23	4	3.75	5.13	B	G
Gramm Motor Truck Co., Lima, O.												
Utility	2800	1350	.....	120	29	18	27	4	4.13	4.5	S	T

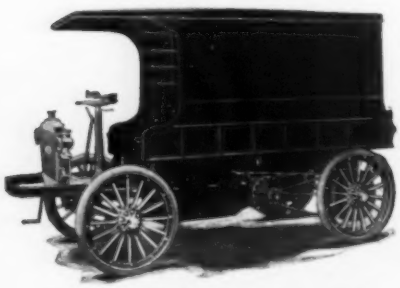
Coleman Model D, 2000-lb. Flareboard, $2100.
Also Stake, $2100.

1600 Pound Gasoline Commercial Cars

Palmer-Moore Co., Syracuse, N. Y.												
.....	2200	1350	P, S, F, C	102	34	18	*32	3	4	4	S	W

2000 Pound Gasoline Commercial Cars

Adams Bros. Co., Findlay, O.												
A	3400	1850	.....	121	34	15	23	4	3.75	5.25	B	C
A	3400	1850	.....	136	34	15	23	4	3.75	5.25	B	C
O. Armleder Co., Cincinnati, O.												
B	3700	2200	P, S, F	136	34	18	27	4	4.13	5.25	B	C
Atterbury Motor Car Co., Buffalo, N. Y.												
B W	3850	2100	.....	137	39	19	23	4	3.75	5.25	B	W
C. L. Barker, Norwalk, Conn.												
.....	4100	2000	.....	130	36	27	26	4	4	5	B	T
Bessemer Motor Truck Co., Grove City, Pa.												
C	2500	1250	.....	108	32	21	20	4	3.5	5	B	T
Bowling Green Motor Truck Co., Bowling Green, O.												
L	3200	1750	.....	136	..	18	23	4	3.75	5.25	B	C
Coleman Motor Truck Co., Ilion, N. Y.												
D	....	2000	S, E	112	36	16	23	4	3.75	5.25	B	C
Gramm-Bernstein Co., Lima, O.												
.....	3500	1750	.....	130	44	16	23	4	3.75	5.25	B	C
.....	....	1650	.....	140	..	20	20	4	3.5	5	B	T
Hurlburt Motor Truck Co., New York City.												
.....	....	1500	.....	O	32	18	23	4	3.75	5.5	B	C
International Motor Co., New York City.												
AB	4060	....	.....	132	36	18	26	4	4	5	P	C
AB	4060	....	.....	144	36	18	26	4	4	5	P	C
H. J. Koehler S. G. Co., Newark, N. J.												
.....	2200	725	F, S, C, E, H	90	...	20	22	2	5.25	4	S	T
Krebs Commercial Car Co., Clyde, O.												
....	....	....	C	118	..	15	23	4	3.75	5.25	B	C
Lippard-Stewart Motor Car Co., Buffalo, N. Y.												
H	3300	2000	.....	145	..	20	23	4	3.75	5.25	B	C
Lord Baltimore Motor Truck Co., Baltimore, Md.												
B	....	2000	C	124	..	..	23	4	3.75	5.25	..	W
Maccarr Truck Co., Scranton, Pa.												
B	3100	1900	.....	138	37	14	27	4	4.13	5.25	B	C
E	2900	1900	.....	150	37	14	27	4	4.13	5.25	B	C
Martin Carriage Works, York, Pa.												
R	3850	2050	.....	125	34	18	26	4	4	5	B	C



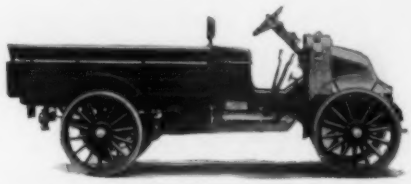
Koehler 2000-lb. Canvas Side, $800.

Atterbury Model B-W, 2000-lb. Canopy Top, Chassis, $2100.

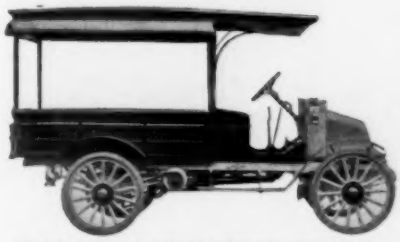
Armleder Model B, 2000-lb. Panel, Chassis, $2200.
Also Stake and Flareboard.

Lord Baltimore, Model B, 2000-lb. Screenside, Chassis, $2000.

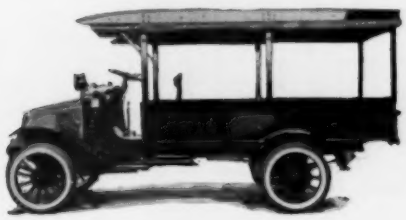
B. A. Gramm's 2000-lb. Covered Flareboard, Chassis, $1750.
Made by Gramm-Bernstein Co.



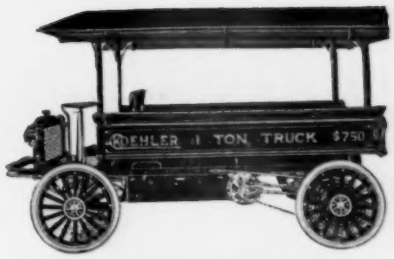
Palmer-Moore 1600-lb. Flareboard, $1425.



Palmer-Moore 1600-lb. Canopy Top, $1475.
Also Stake, $1425; Panel, $1500.



Krebs Model G, 2000-lb. Covered Flareboard, $1900.



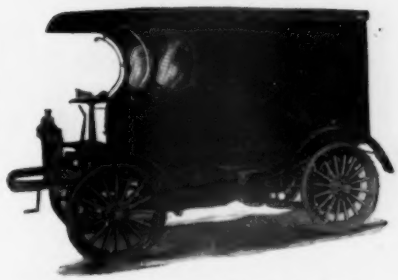
Koehler 2000-lb. Express, $790.

1500 Pound Gasoline Commercial Cars

Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
					White Co., Cleveland, O.									
H	SP	SF	B	S	D	B	S	4	34x4*	34x4*	L	C	..	..
					Gramm Motor Truck Co., Lima, O.									
T	SL	SF	SD	S	C	C	S	3	34x4½*	36x3½	R	C	70	..

1600 Pound Gasoline Commercial Cars

					Palmer-Moore Co., Syracuse, N. Y.									
C	SP	M	B	¼	D	C	S	3	.....	.....	R	C	60	..



Koehler 2000-lb. Full Panel, $900.

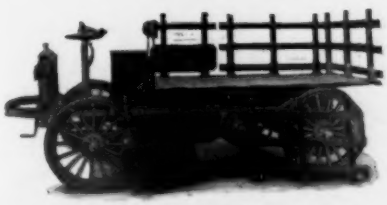
2000 Pound Gasoline Commercial Cars

					Adams Bros. Co., Findlay, O.									
T	Z	F	E	S	D	C	S	3	36x3½	36x4	L	C	75	X
T	Z	F	E	S	D	C	S	3	36x3½	36x4	L	C	75	X
					O. Armleder Co., Cincinnati, O.									
H	SL	SF	B	S	D	B	S	3	40x4*	39x5*	L	C	80	..
					Atterbury Motor Car Co., Buffalo, N. Y.									
H	SB	SF	B	S	D	W	S	3	36x3½	36x5	L	C	70	..
					C. L. Barker, Norwalk, Conn.									
H	SB	F	E	S	D	W	S	4	42x3½	42x5	L	C	80	..
					Bessemer Motor Truck Co., Grove City, Pa.									
V	R	SF	E	S	C	C	S	3	35x3	35x3½	L	C	..	..
					Bowling Green Motor Truck Co., Bowling Green, O.									
H	SL	SF	B	S	D	W	S	3	36x3½	36x4	L	C	60	..
					Coleman Motor Truck Co., Ilion, N. Y.									
H	SL	..	B	S	C	C	S	3	36x3½	36x4	R	R	70	..
					Gramm-Bernstein Co., Lima, O.									
C	SL	SF	B	S	C	C	IC	3	34x3½	36x4	L	C	70	..
..	..	SF	..	..	D	W	IC	3	34x3½	36x5	L	C	..	X
					Hurlburt Motor Truck Co., New York City.									
H	F	F	E	S	D	W	S	3	34x4½*	34x4½*	L	C	..	..
					International Motor Co., New York City.									
H	O	SG	B	S	D	W	S	3	36x4	36x3D	L	C	66	..
H	O	SG	B	S	D	W	S	3	36x4	36x3D	L	C	66	..
					K. J. Koehler S. G. Co., Newark, N. J.									
V	K	F	SD	S	C	C	L	2	36x2½	36x2½	L	C	60	..
					Krebs Commercial Car Co., Clyde, O.									
V	SL	S	B	S	C	W	S	3	34x3½	34x4	L	C	65	..
					Lippard-Stewart Motor Car Co., Buffalo, N. Y.									
V	O	S	E	S	C	W	S	3	36x3	36x5	L	C	70	..
					Lord Baltimore Motor Truck Co., Baltimore, Md.									
..	R	..	..	S	C	C	S	.	34x3	34x3	L	L	..	..
					Maccarr Truck Co., Scranton, Pa.									
T	SB	SF	E	½	D	C	S	3	4	5	L	C	65	..
T	SB	SF	E	½	D	W	S	3	4	5	L	C	65	..
					Martin Carriage Works, York, Pa.									
T	SB	SF	B	S	D	C	S	3	36x3½	36x4	R	R	67	X

Adams, Model A, 2000-lb. Canopy Top, Chassis, $1850.

Martin Model R, 2000-lb. Screenside, Chassis, $2050.

Croce Model A, 2000-lb. Panel, $1850.



Koehler 2000-lb. Stake Side, $750.

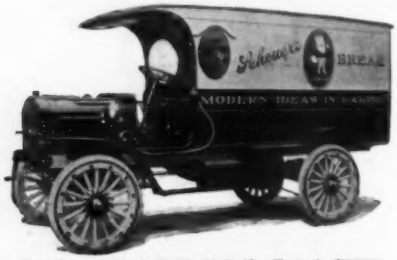
Mack 2000-lb. Canopy Top.
Made by International Motor Co.

Bessemer Model C, 2000-lb. Flareboard, Chassis, $1250.

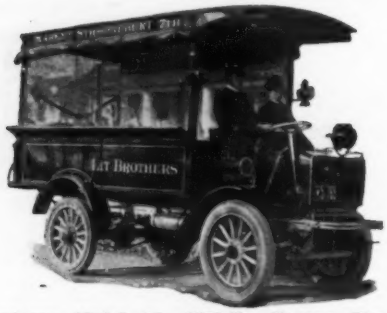
Koehler 2000-lb. Baker's & Confectioner's Delivery, $925.
Also Open Flareboard, $750; Contractor's, $800; Furniture Body, $825.

Trabold Model T, 2000-lb. Stake, $1375.
Also Panel, $1400; Flareboard, $1350.

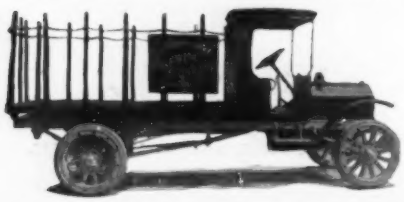
Transit Model E, 2000-lb. Screenside, Chassis, $2000.
Also Panel, $2200; Stake, $2200; Flareboard, $2200.



Brockway Model H, 2500-lb. Panel, $1850.
Also Panel, $1800; Stake, $1700; Flareboard, $1650.



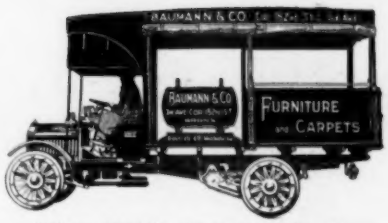
Autocar Model 21, 3000-lb. Canopy Top, Chassis, $1850.
Also Stake, $2025; Open Express, $2000.



Modern Model M, 3000-lb. Stake, Chassis, $2000.
Made by Bowling Green Motor Truck Co.

Lippard-Stewart Model F, 3000-lb. Canopy Top Chassis, $2300.

Tiffin Model G, 2000-lb. Flareboard, $2120.
Also Stake, $2136.



Selden 3000-lb. Covered Stake, $2000.

2000 Pound Gasoline Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
Standard Motor Truck Co., Warren, O.												
A	3200	1700	.....	124	..	18	26	4	4	4.5	P	W
A	3200	1700	.....	134	..	18	26	4	4	4.5	P	W
AX	3750	1900	.....	124	..	18	26	4	4	4.5	P	W
AX	3750	1900	.....	134	..	18	26	4	4	4.5	P	W
Tiffin Wagon Co., Tiffin, O.												
G	3350	2000	S, F	128	33	16	23	4	3.75	5.25	B	C
Trabold Truck Mfg. Co., Johnstown, Pa.												
T	2800	1250	P, S, F	120	32	18	20	4	3.5	5	B	W
T	2800	1250	P, S, F	120	32	18	20	4	3.5	5	B	W
Transit Motor Truck Co., Louisville, Ky.												
E	3700	2000	P, S, F	O	40	15	32	4	4.5	5.5	B	C

2500 Pound Gasoline Commercial Cars

Brockway Motor Truck Co., Cortland, N. Y.												
H	3500	1590	P, S, F	114	34	15	23	4	3.75	5.25	B	C
H	3500	1590	P, S, F	124	34	15	23	4	3.75	5.25	B	C
J	3500	1840	P, S, F	124	34	15	23	4	3.75	5.25	B	C
J	3500	1840	P, S F	140	34	15	23	4	3.75	5.25	B	C

3000 Pound Gasoline Commercial Cars

Adams Bros. Co., Findlay, O.												
D	3800	2300	.....	121	34	13	27	4	4.13	5.25	B	C
D	3800	2300	.....	136	34	13	27	4	4.13	5.25	B	C
O. Armleder Co., Cincinnati, O.												
H	4500	2150	P, S, F	136	34	16	32	4	4.5	5.5	B	C
H	4500	2150	P, S, F	148	34	16	32	4	4.5	5.5	B	C
H	4500	2150	P, S, F	160	34	16	32	4	4.5	5.5	B	C
Auglaize Motor Car Co., New Bremen, O.												
D	3200	1700	.....	100	34	15	23	4	3.75	5.13	B	G
Autocar Co., Ardmore, Pa.												
21	3300	1850	E, S	97	31	20	18	2	4.75	4.5	S	W
Bessemer Motor Truck Co., Grove City, Pa.												
A	3250	1800	.....	136	32	18	27	4	4.13	5.25	B	T
Bowling Green Motor Truck Co., Bowling Green, O.												
M	3800	2000	.....	O	..	16	27	4	4.13	5.25	B	C
H	3800	1800	.....	..	..	15	27	4	4.13	5.25	B	C
Chase Motor Truck Co., Syracuse, N. Y.												
R	4800	2200	P, S, F	146	31	18	27	4	4.13	5.25	B	C
R	4800	2200	P, S, F	160	31	18	27	4	4.13	5.25	B	C
Delahunty Dyeing Machine Co., Pittstown, Pa.												
F	3700	1750	P, S, F	130	29	17	27	4	4.13	5.5	B	C
Gabriel Auto Co., Cleveland, O.												
M	4200	2300	P, S, F	144	30	25	27	4	4.13	5.25	B	C
.....	4200	2500	F	144	30	25	27	4	4.13	5.25	B	C
Kelly-Springfield Motor Truck Co., Springfield, O.												
K-30	3800	2000	.....	120	31	15	23	4	3.75	5.25	B	C
K-30	3800	2000	.....	144	31	15	23	4	3.75	5.25	B	C
Kentucky Wagon Mfg. Co., Louisville, Ky.												
30-W	3300	1900	S, F	110	..	18	23	4	3.75	5	B	T
Lange Motor Truck Co., Pittsburgh, Pa.												
C	4250	2250	.....	125	40	18	23	4	3.75	5.25	B	T
Lippard-Stewart Motor Car Co., Buffalo, N. Y.												
F	4500	2300	.....	145	42	13	27	4	4.13	5.25	B	C
F	4500	2300	.....	158	42	13	27	4	4.13	5.25	B	C
Maccarr Truck Co., Scranton, Pa.												
C	3200	2150	.....	150	37	12	27	4	4.13	5.25	B	C
C	3200	2150	.....	162	37	12	27	4	4.13	5.25	B	C
Mansur Motor Truck Co., Haverhill, Mass.												
.....	2900	2300	P, S, F	124	36	16	26	4	4	4.5	P	C
Martin Carriage Works, York, Pa.												
S	4200	2150	.....	121	36	16	26	4	4	5	B	C
Maxim Motor Co., Middleboro, Mass.												
F4	3700	....	F	130	..	O	32	4	4.5	5	B	C
Rowe Motor Mfg. Co., Downingtown, Pa.												
CW	....	2450	.....	144	30	16	23	4	3.75	5	B	C
Selden Motor Vehicle Co., Rochester, N. Y.												
JB	4000	2000	S, F	150	36	15	23	4	3.75	5.25	B	G
Sullivan Motor Car Co., Rochester, N. Y.												
G	3400	1600	S	129	40	18	23	4	3.75	4.5	B	T

Adams Model D, 3000-lb. Stake, Chassis, $2300.

BODY DETAILS OF CARS NOT ILLUSTRATED

Chase Model R, 3000-lb. Panel, $2825.
Also Stake, $2450; Flareboard, $2375.

Auglaize Model D, 3000-lb. Flareboard, Chassis, $1700.

BODY DETAILS OF CARS NOT ILLUSTRATED

Delahunty Model F, 3000-lb. Panel, $1850.
Also Stake, $1825; Flareboard, $1800.

Maxim Model F-4, Flareboard.

Gabriel Model M, 3000-lb. Flareboard, $2350.
Also Panel, $2550; Stake, $2500.

Mansur 3000-lb. Flareboard, $2400.
Also Panel, $2425; Stake, $2400.

2000 Pound Gasoline Commercial Cars

Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
					Standard Motor Truck Co., Warren, O.									
C	SB	S	E	S	D	C	S	3	36x4*	36x3½	R	R	65	..
C	SB	S	E	S	D	C	S	3	36x4*	36x3½	R	R	65	..
C	SB	S	E	S	D	W	S	3	36x4½*	36x4	R	C	65	..
C	SB	S	E	S	D	W	S	3	36x4½*	36x4	R	C	65	..
					Tiffin Wagon Co., Tiffin, O.										
V	SL	SF	B	S	C	C	S	3	.....	.....	L	C	75	..
					Trabold Truck Mfg. Co., Johnstown, Pa.									
H	SB	S	BR	S	D	C	S	3	36x3	38x3½	L	C	90	..
H	SB	S	BR	S	D	W	S	3	36x3	38x3½	L	C	90	..
					Transit Motor Truck Co., Louisville, Ky.										
H	R	SF	M	S	D	C	S	3	36x3½	36x3½D	R	R	66	..

2500 Pound Gasoline Commercial Cars

					Brockway Motor Truck Co., Cortland, N. Y.									
V	SL	SF	B	S	C	C	S	3	3½	4	L	C	70	..
V	SL	SF	B	S	C	C	S	3	3½	4	L	C	70	..
V	SL	SF	B	S	D	W	S	3	3½	4	L	C	70	..
V	SL	SF	B	S	D	W	S	3	3½	4	L	C	70	..

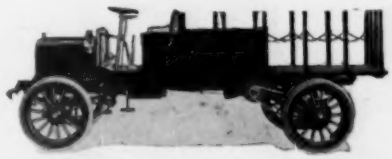
3000 Pound Gasoline Commercial Cars

					Adams Bros. Co., Findlay, O.									
T	Z	F	E	S	D	C	S	3	36x3½	36x3½D	L	C	75	X
T	Z	F	E	S	D	C	S	3	36x3½	36x3½D	L	C	75	X
					O. Armleder Co., Cincinnati, O.										
H	SL	S	B	S	D	C	S	3	40x4	40x6	L	C	80	..
H	SL	S	B	S	D	C	S	3	40x4	40x6	L	C	80	..
H	SL	S	B	S	D	C	S	3	40x4	40x6	L	C	80	..
					Auglaize Motor Car Co., New Bremen, O.										
H	SL	SF	R	½	D	C	S	3	36x3½	36x4	R	C	70	..
					Autocar Co., Ardmore, Pa.									
T	SB	SF	B	S	D	B	P	3	36x4	36x5	R	R	63	..
					Bessemer Motor Truck Co., Grove City, Pa.									
V	R	SF	E	½	C	C	S	3	37x3½	37x5	L	C	..	..
					Bowling Green Motor Truck Co., Bowling Green, O.									
H	SL	SF	B	S	D	W	S	3	36x3½	36x5	L	C	66	..
H	SL	SF	B	S	C	C	S	3	36x3½	36x5	L	C	66	..
					Chase Motor Truck Co., Syracuse, N. Y.									
T	H	SF	B	S	D	W	S	3	36x3½	36x5	R	C	72	..
T	H	SF	B	S	D	W	S	3	36x3½	36x5	R	C	72	..
					Delahunty Dyeing Machine Co., Pittstown, Pa.									
T	SB	SF	E	S	C	C	S	3	34x3½	38x3D	L	C	80	..
					Gabriel Auto Co., Cleveland, O.									
H	SB	SF	B	S	C	B	S	4	36x5	36x5D	L	C	65	..
H	SB	SF	B	S	C	W	S	4	36x5	36x5D	L	C	65	..
					Kelly-Springfield Motor Truck Co., Springfield, O.									
C	B	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	B	F	E	S	C	C	S	3	.....	.....	L	C	80	..
					Kentucky Wagon Mfg. Co., Louisville, Ky.									
V	H	SF	H	S	C	W	S	3	33x3½	33x4	L	L	60	..
					Lange Motor Truck Co., Pittsburgh, Pa.									
H	SB	SF	C	S	D	C	IC	3	36x3½	38x4	L	C	70	..
					Lippard-Stewart Motor Car Co., Buffalo, N. Y.									
V	O	S	E	S	C	W	S	.	36x3½	36x3D	L	C	70	..
V	O	S	E	S	C	W	S	.	36x3½	36x3D	L	C	70	..
					Maccarr Truck Co., Scranton, Pa.									
T	SB	SF	E	½	D	C	S	3	4	6	L	C	65	..
T	SB	SF	E	½	D	C	S	3	4	6	L	C	65	..
					Mansur Motor Truck Co., Haverhill, Mass.									
C	Z	SF	E	S	D	W	S	3	36x4	36x5	O	O	75	E
					Martin Carriage Works, York, Pa.									
T	SB	SF	B	S	D	C	S	3	36x3½	40x4	R	R	60	X
					Maxim Motor Co., Middleboro, Mass.									
C	SL	S	B	⅛	C	C	S	3	.....	.....	L	C	65	X
					Rowe Motor Mfg. Co., Downingtown, Pa.									
H	..	F	B	S	D	W	S	3	.....	.....	R	R	80	X
					Selden Motor Vehicle Co., Rochester, N. Y.									
V	SB	SF	B	S	D	C	S	3	36x3½	36x5	L	C	70	..
					Sullivan Motor Car Co., Rochester, N. Y.									
..	H	S	B	S	C	C	S	3	36x3	36x4	L	C	67	..

Kelly-Springfield Model K-30, 3000-lb. Chassis, $2000.

BODY DETAILS OF CARS NOT ILLUSTRATED

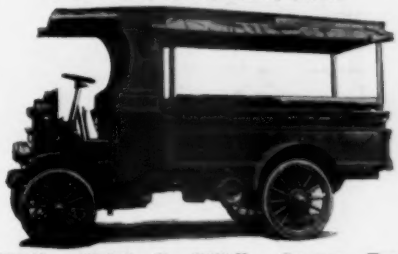
Gabriel 3000-lb. Flareboard, $2500.



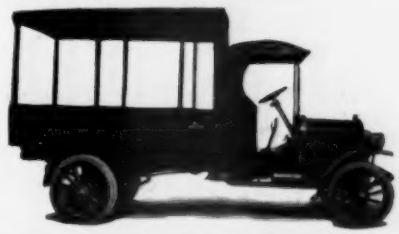
Sullivan Model G, 3000-lb. Stake, $1710.

BODY DETAILS OF CARS NOT ILLUSTRATED

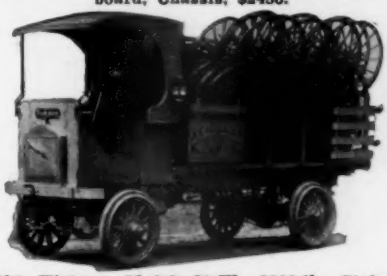
Brockway Model J, 2500-lb. Panel, $2050.
Also Stake, $1950; Flareboard, $1900.



Martin Model S, 3000-lb. Canopy Top Chassis, $2150.



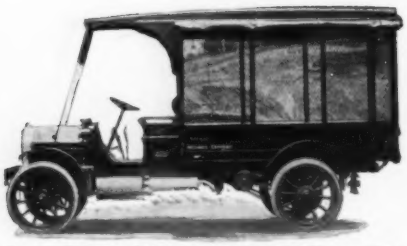
Rowe Model C-W, 3000-lb. Covered Flareboard, Chassis, $2450.



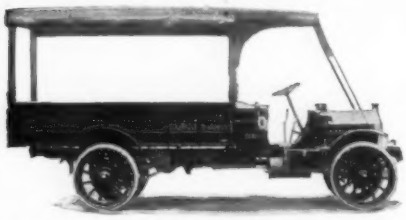
Old Hickory Model 30-W, 3000-lb. Stake, $2000.
Also Flareboard, $2000.
Made by Kentucky Wagon Mfg. Co.

Bessemer Model A, 3000-lb. Tank Body, Chassis, $1800.

Autocar Model 21, 3000-lb. Panel, Chassis, $1850.



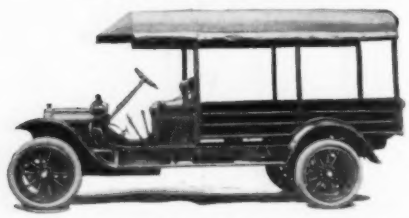
New York Model L, 3000-lb. Screenside, Chassis, $2000.
Made by Tegetmeier & Riepe Co.



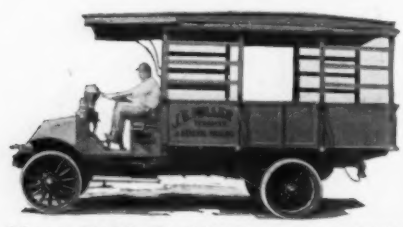
New York Model L, 3000-lb. Canopy Top, Chassis, $2000.
Made by Tegetmeier & Riepe Co.

New York Model L, 3000-lb. Panel; Chassis, $2000.
Made by Tegetmeier & Riepe Co.

New York Model L, 3000-lb. Panel; Chassis, $2000
Made by Tegetmeier & Riepe Co



White Model TBC, 3000-lb. Canopy Top, $3150.
Also Platform, $3150.



Adams Model E, 4000-lb. Covered Stake, Chassis, $2500.

Armleder Model H, 4000-lb. Flareboard, Chassis, $2150.
Also Panel and Stake.

Bessemer Model D, 4000-lb. Sided Stake, Chassis, $2300.

3000 Pound Gasoline Commercial Cars

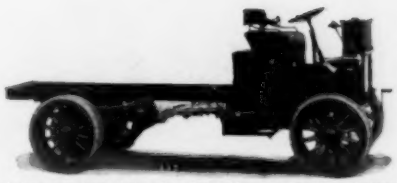
Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
Standard Motor Truck Co., Warren, O.												
B	3600	1800	.....	134	..	18	26	4	4	4.5	P	W
B	3600	1800	.....	144	..	18	26	4	4	4.5	P	W
BX	4000	2100	.....	134	..	18	26	4	4	4.5	P	W
BX	4000	2100	.....	144	..	18	26	4	4	4.5	P	W
Tegetmeier & Riepe Co., New York City.												
L	3600	2000	.....	129	34	18	23	4	3.75	5.25	B	C
White Co., Cleveland, O.												
TBC	4150	3000	E, S	145	34	..	23	4	3.75	5.13	B	G

4000 Pound Gasoline Commercial Cars

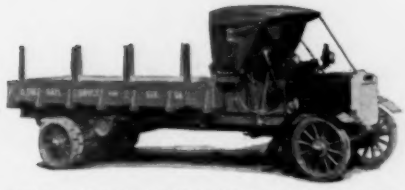
Adams Bros. Co., Findlay, O.												
E	4100	2500	.....	140	34	12	27	4	4.13	5.25	B	C
E	4100	2500	.....	160	34	12	27	4	4.13	5.25	B	C
O. Armleder Co., Cincinnati, O.												
H	4500	2150	P, S, F	136	34	16	32	4	4.5	5.5	B	C
H	4500	2150	P, S, F	148	34	16	32	4	4.5	5.5	B	C
H	4500	2150	P, S, F	160	34	16	32	4	4.5	5.5	B	C
Atterbury Motor Car Co., Buffalo, N. Y.												
C-W	4940	2800	.....	150	40	16	27	4	4.13	5.25	B	W
C. L. Barker, Norwalk, Conn.												
.....	4800	2400	.....	136	42	22	26	4	4	5	B	T
Bessemer Motor Truck Co., Grove City, Pa.												
D	4120	2300	.....	136	30	15	27	4	4.13	5.25	B	T
Blair Mfg. Co., Newark, O.												
C1	4150	2850	P, S, F	114	36	14	27	4	4.13	5.25	B	C
C1	4150	2850	P, S, F	121	36	14	27	4	4.13	5.25	B	C
C1	4150	2850	P, S, F	135	36	14	27	4	4.13	5.25	B	C
Brockway Motor Truck Co., Cortland, N. Y.												
I	4000	1875	P, S, F	124	34	15	27	4	4.13	5.25	B	C
I	4000	1875	P, S, F	140	34	15	27	4	4.13	5.25	B	C
I	4000	1875	P, S, F	156	34	15	27	4	4.13	5.25	B	C
K	4000	2125	P, S, F	140	34	15	27	4	4.13	5.25	B	C
K	4000	2125	P, S, F	156	34	15	27	4	4.13	5.25	B	C
Coleman Motor Truck Co., Ilion, N. Y.												
G	4500	2425	S, E	125	37	14	23	4	3.75	5.25	B	C
Corbitt Automobile Co., Henderson, N. C.												
F	3300	2000	P, S, F	130	39	16	23	4	3.75	5.25	B	C
Driggs-Seabury Ordnance Corp., Sharon, Pa.												
.....	5500	2750	.....	150	40	13	18	4	3.38	5.5	P	T
Durable Dayton Truck Co., Dayton, O.												
U	4850	1800	.....	119	44	16	29	4	4.25	5	P	G
Gabriel Auto Co., Cleveland, O.												
M	4200	2300	P, S, F	144	30	25	27	4	4.13	5.25	B	C
.....	4200	2500	F	144	30	25	27	4	4.13	5.25	B	C
Garford Co., Elyria, O.												
L-2	6270	3000	.....	O	48	15	29	4	4.25	5.25	B	G
Gramm-Bernstein Co., Lima, O.												
.....	5300	2600	.....	..	44	15	32	4	4.5	5.5	P	C
.....	5600	2600	.....	146	..	17	27	4	4.13	5.25	B	C
Hurlburt Motor Truck Co., New York City.												
.....	....	3000	.....	O	34	15	27	4	4.13	5.5	B	C
International Motor Co., New York City.												
AB	4600	....	.....	144	36	16	26	4	4	5	P	C
AB	4600	....	.....	162	36	11	23	4	4	5	P	C
Kelly-Springfield Motor Truck Co., Springfield, O.												
K-35	5035	2750	.....	120	31	11	23	4	3.75	5.25	B	C
K-35	5035	2750	.....	144	31	11	23	4	3.75	5.25	B	C
Krebs Commercial Car Co., Clyde, O.												
H	3850	....	SS	144	..	15	27	4	4.13	5.25	B	C
H	3850	....	SS	162	..	15	27	4	4.13	5.25	B	C
Lauth-Juergens Motor Car Co., Fremont, O.												
O	3800	1700	.....	132	32	16	23	4	3.75	5.5	B	C
O	3800	1750	.....	144	32	16	23	4	3.75	5.5	B	C
Lippard-Stewart Motor Car Co., Buffalo, N. Y.												
G	4650	2600	.....	158	42	15	27	4	4.13	5.25	B	C
G	4650	2600	.....	165	42	15	27	4	4.13	5.25	B	C

Atterbury Model C-W, 4000-lb. Flareboard, Chassis, $2800.

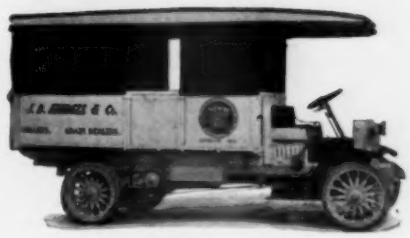
Mack 4000-lb. Canopy Top.
Made by International Motor Co.



Coleman Model G, 4000-lb. Chassis, $2425.
Also Stake, $2550; Express, $2550.



Vulcan 4000-lb. Sided Stake, Chassis, $2750.
Made by Driggs-Seabury Ordnance Corp.



B. A. Gramm's 4000-lb. Canopy Top, Chassis, $2600.
Made by Gramm-Bernstein Co.

3000 Pound Gasoline Commercial Cars

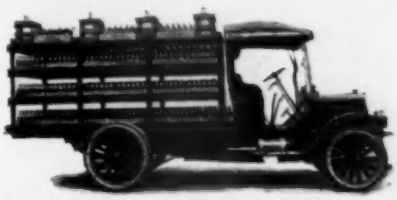
Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
Standard Motor Truck Co., Warren, O.														
C	SB	S	E	S	D	C	S	3	37x4½*	36x4	R	R	65	..
C	SB	S	E	S	D	C	S	3	37x4½*	36x4	R	R	65	..
C	SB	S	E	S	D	W	S	3	37x5*	36x5	R	C	65	..
C	SB	S	E	S	D	W	S	3	37x5*	36x5	R	C	65	..
Tegetmeier & Riepe Co., New York City.														
H	SB	SF	B	S	C	C	S	3	.....	.....	R	R	60	..
White Co., Cleveland, O.														
H	SP	SF	B	S	D	B	S	4	36x4½*	36x4½D	L	C	..	..

4000 Pound Gasoline Commercial Cars

Adams Bros. Co., Findlay, O.														
T	Z	F	E	S	D	C	S	3	36x4	36x4D	L	C	75	X
T	Z	F	E	S	D	C	S	3	36x4	36x4D	L	C	75	X
O. Armleder Co., Cincinnati, O.														
H	SL	S	B	S	D	C	S	3	40x4	40x6	L	C	80	..
H	SL	S	B	S	D	C	S	3	40x4	40x6	L	C	80	..
H	SL	S	B	S	D	C	S	3	40x4	40x6	L	C	80	..
Atterbury Motor Car Co., Buffalo, N. Y.														
H	SB	SF	B	S	D	W	S	3	36x4	36x4D	L	C	70	..
C. L. Barker, Norwalk, Conn.														
H	SB	F	E	S	D	W	S	4	36x4	36x7	L	C	80	..
Bessemer Motor Truck Co., Grove City, Pa.														
V	R	SF	E	½	C	W	S	3	37x4	37x3½D	L	C	..	..
Blair Mfg. Co., Newark, O.														
H	SU	SF	B	S	C	W	IC	3	34x4	34x3½D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	34x4	34x3½D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	34x4	34x3½D	..	R	75	X
Brockway Motor Truck Co., Cortland, N. Y.														
V	SL	SF	B	S	C	C	S	3	4	5	L	C	70	..
V	SL	SF	B	S	C	C	S	3	4	5	L	C	70	..
V	SL	SF	B	S	C	C	S	3	4	5	L	C	70	..
V	SL	SF	B	S	D	W	S	3	4	5	L	C	70	..
V	SL	SF	B	S	D	W	S	3	4	5	L	C	70	..
Coleman Motor Truck Co., Ilion, N. Y.														
H	SL	SF	B	S	C	C	S	3	36x4	36x3½D	R	R	73	..
Corbitt Automobile Co., Henderson, N. C.														
C	SB	S	B	M	D	C	S	3	3½	3½D	L	C	75	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.														
H	SB	SF	B	M	C	C	S	3	36x4	36x3½D	R	R	70	..
Durable Dayton Truck Co., Dayton, O.														
T	O	SF	B	S	D	C	S	3	36x4	36x3D	L	C	58	..
Gabriel Auto Co., Cleveland, O.														
H	SB	SF	B	S	C	B	S	4	36x5	36x5D	L	C	65	..
H	SB	SF	B	S	C	W	S	4	36x5	36x5D	L	C	65	..
Garford Co., Elyria, O.														
V	SP	SF	B	S	C	C	S	3	36x5	40x3½D	R	R	41	..
Gramm-Bernstein Co., Lima, O.														
C	SL	SF	B	S	D	W	IC	3	36x4	36x3½D	L	C	70	X
C	..	SF	..	..	D	W	IC	3	36x4	36x3½D	L	C	70	X
Hurlburt Motor Truck Co., New York City.														
T	F	F	E	S	D	W	S	3	36x4	36x4D	L	C	..	..
International Motor Co., New York City.														
H	O	SG	B	S	D	W	S	3	36x4	36x3½D	L	C	71	..
H	O	SG	B	S	D	W	S	3	36x4	36x3½D	L	C	71	..
Kelly-Springfield Motor Truck Co., Springfield, O.														
C	B	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	B	F	E	S	C	C	S	3	.....	.....	L	C	80	..
Krebs Commercial Car Co., Clyde, O.														
V	SL	S	B	S	C	W	S	3	36x4	36x6	L	C	65	..
V	SL	S	B	S	C	W	S	3	36x4	36x6	L	C	65	..
Lauth-Juergens Motor Car Co., Fremont, O.														
T	H	SF	E	S	C	IG	S	3	.....	.....	R	C	70	..
T	H	SF	E	S	C	IG	S	3	.....	.....	R	C	70	..
Lippard-Stewart Motor Car Co., Buffalo, N. Y.														
V	O	S	E	S	C	W	S	.	36x4	36x4D	L	C	70	..
V	O	S	E	S	C	W	S	.	36x4	36x4D	L	C	70	..

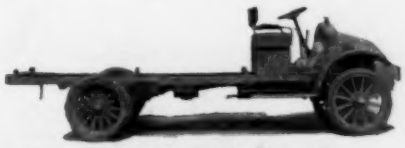
Brockway Model I, 4000-lb. Flareboard, $1950.
Also Canopy Top, $2000; Panel, $2150; Stake, $2000.

Krebs Model H, 4000-lb. Canopy Top, $2350.



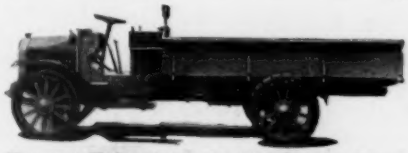
Corbitt Model F, 4000-lb. Bottle Body, Chassis, $2000.
Also Panel, $2150; Stake, $2150; Flareboard, $2150.

Lippard-Stewart Model G, 4000-lb. Covered Stake, Chassis, $2600.



Kelly-Springfield Model K-35, 4000-lb. Chassis, $2750.

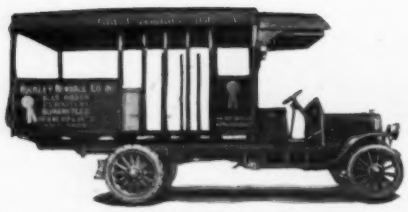
BODY DETAILS OF CARS NOT ILLUSTRATED
Brockway Model K, 4000-lb. Panel, $2450.
Also Stake, $2250; Flareboard, $2200.



Fremont-Main Model O, 4000-lb. Flareboard, Chassis, $1700.
Made by Lauth-Juergens Motor Car Co.

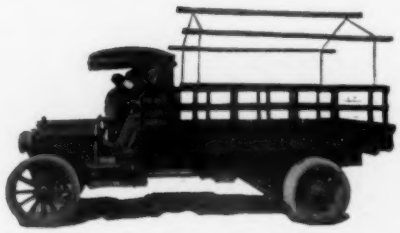
BODY DETAILS OF CARS NOT ILLUSTRATED
Blair Model C-1, 4000-lb. Stake, $2975.

Durable Dayton Model U, 4000-lb. Flareboard, Chassis, $1800.

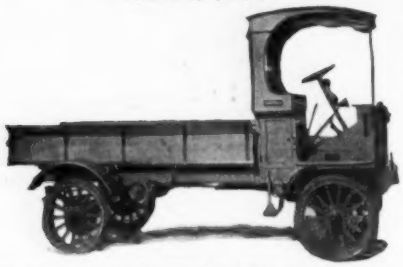


Rowe Model D-W, 4000-lb. Covered Stake, Chassis, $2800.

Schacht 4000-lb. Flareboard, $3000.



Armleder Model E, 5000-lb. Stake, Chassis, $2500.



Sanford Model L, 4000-lb. Flareboard, $2000.
Also Stake, $2000.

Sanford Model M, 4000-lb. Flareboard, $2000.
Also Stake, $2000.

United States Model E, 4000-lb. Canopy Top, Chassis, $2550.

Speedwell Model S-Y, 4000-lb. Chassis, $2850.
Also Panel, $2950; Stake, $2950; Flareboard, $2950.

Trabold Model F, 4000-lb. Covered Flareboard, Chassis, $2450.

BODY DETAILS OF CARS NOT ILLUSTRATED

Tiffin Model M, 4000-lb. Stake, $2885.
Also Flareboard, $2860.

4000 Pound Gasoline Commercial Cars

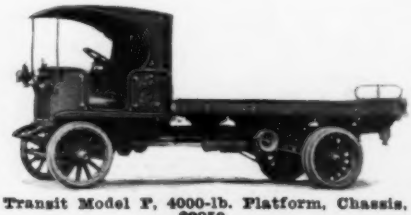
Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
			Lord Baltimore Motor Truck Co., Baltimore, Md.									
D	....	2500	.....	138	..	..	27	4	4.13	5.25	..	W
			Maccarr Truck Co., Scranton, Pa.									
F	3600	2400	.....	150	37	12	27	4	4.13	5.25	B	C
D	4000	2400	.....	162	37	14	27	4	4.13	5.25	B	C
			Maxim Motor Co., Middleboro, Mass.									
F-6	4000	....	F	130	..	..	32	4	4.5	5	B	C
			Pierce-Arrow Motor Car Co., Buffalo, N. Y.									
.....	....	3000	S	150	42	16	25	4	4	5.5	P	C
.....	....	3000	S	180	42	16	25	4	4	5.5	P	C
			Rowe Motor Mfg. Co., Downingtown, Pa.									
DW	2800	....	.....	152	30	15	25	4	4	5	B	C
			Sanford Motor Truck Co., Syracuse, N. Y.									
L	3575	1910	P, S, F	118	37	14	29	4	4.25	5	P	C
M	3600	1910	P, S, F	140	35	14	29	4	4.25	5	P	C
			G. A. Schacht Motor Truck Co., Cincinnati, O.									
.....	5000	2800	F	138	38	15	29	4	4.25	5.5	B	W
			Selden Motor Vehicle Co., Rochester, N. Y.									
JW	3200	2250	.....	130	30	13	27	4	4.13	5.25	B	C
JWL	3200	2250	.....	150	30	13	27	4	4.13	5.25	B	C
			Speedwell Motor Car Co., Dayton, O.									
Y	4900	2850	P, S, F	115	41	15	27	4	4.13	5.25	B	C
			Standard Motor Truck Co., Warren, O.									
C	4200	2000	.....	144	..	18	26	4	4	4.5	P	W
C	4200	2000	.....	148	..	18	26	4	4	4.5	P	W
			W. M. Steele, Worcester, Mass.									
C	5700	2500	.....	115	46	15	27	4	4.13	5.25	B	C
			Tiffin Wagon Co., Tiffin, O.									
M	4625	2700	S F	140	36	14	27	4	4.13	5.25	B	C
			Trabold Truck Mfg. Co., Johnstown, Pa.									
F	4800	2450	P, S, F	130	34	16	27	4	4.13	5.5	B	W
F	4800	2450	P, S, F	130	34	16	27	4	4.13	5.5	B	W
			Transit Motor Truck Co., Louisville, Ky.									
F	4000	2850	P, S, F	144	40	14	32	4	4.5	5.5	B	C
			United States Motor Truck Co., Cincinnati, O.									
E	....	2550	.....	132	43	15	27	4	4.13	5.25	B	C

5000 Pound Gasoline Commercial Cars

			O. Armleder Co., Cincinnati, O.									
E	5000	2500	P, S, F	136	32	14	32	4	4.5	5.5	B	C
E	5000	2500	P, S, F	148	32	14	32	4	4.5	5.5	B	C
E	5000	2500	P, S, F	160	32	14	32	4	4.5	5.5	B	C
			Croce Auto Works, Asbury Park, N. J.									
C	5300	2600	.....	144	36	16	26	4	4	5	B	W
			Lange Motor Truck Co., Pittsburgh, Pa.									
B	5400	3000	.....	136	43	15	27	4	4.13	5.25	B	T
			Martin Carriage Works, York, Pa.									
E	6000	2800	.....	140	38	14	29	4	4.25	5	P	C
			United States Motor Truck Co., Cincinnati, O.									
G	....	2750	.....	138	43	15	27	4	4.13	5.25	B	C

6000 Pound Gasoline Commercial Cars

			Atterbury Motor Car Co., Buffalo, N. Y.									
DW	6020	3650	.....	168	42	12	32	4	4.5	5.5	P	W
			Blair Mfg. Co., Newark, O.									
D1	5250	3250	P, S, F	121	36	14	32	4	4.5	5.5	P	C
D1	5250	3250	P, S, F	135	36	14	32	4	4.5	5.5	P	C
D1	5250	3250	P, S, F	144	36	14	32	4	4.5	5.5	P	C
			Chase Motor Truck Co., Syracuse, N. Y									
O	6200	3300	P, S, F	175	33	12	32	4	4.5	5.25	P	C
			Coleman Motor Truck Co., Ilion, N. Y.									
H	5500	3000	P, S, F, E	134	38	12	27	4	4.13	5.5	P	C
			Crawford Automobile Co., Hagerstown, Md.									
.....	6000	3000	P, S, F	144	45	12	32	4	4.5	5.5	P	C
			Driggs-Seabury Ordnance Corp., Sharon, Pa.									
.....	6075	3250	.....	156	40	13	18	4	3.38	5.5	P	T
			Durable Dayton Truck Co., Dayton, O.									
R	....	2250	.....	136	44	14	36	4	4.75	5.5	P	G
			International Motor Co., New York City.									
.....	7800	....	.....	132	42	16	48	4	5.5	6	P	C
.....	7800	....	.....	198	42	16	48	4	5.5	6	P	C

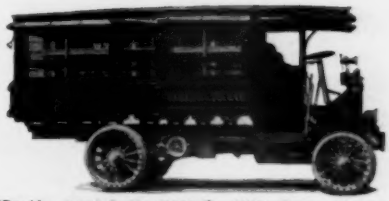


Transit Model F, 4000-lb. Platform, Chassis, $2850.
Also Panel, $3050; Stake, $3050; Flareboard, $3050.

Lange Model B, 5000-lb. Covered Canvas Side, Chassis, $3000.

Lange Model B, 5000-lb. Covered Flareboard, Chassis, $3000.

Coleman Model H, 6000-lb. Canopy Top, $3150.
Also Stake, $3150; Express, $3150.



Martin Model E, 5000-lb. Side Door Canopy Top, Chassis, $2800.

4000 Pound Gasoline Commercial Cars

Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
					Lord Baltimore Motor Truck Co., Baltimore, Md.									
..	SL	..	..	S	D	IG	S	.	36x4	36x3D	L	L	..	..
					Maccarr Truck Co., Scranton, Pa.									
T	SB	SF	E	½	D	C	S	3	4	4D	L	C	65	..
T	SB	SF	E	½	D	W	S	3	4	4D	L	C	65	..
					Maxim Motor Co., Middleboro, Mass.									
C	SL	S	B	½	C	C	S	3	.....	.....	L	C	65	X
					Pierce-Arrow Motor Car Co., Buffalo, N. Y.									
T	SP	F	B	S	C	W	S	3	36x4	36x4D	R	R	85	..
T	SP	F	B	S	C	W	S	3	36x4	36x4D	R	R	85	..
					Rowe Motor Mfg. Co., Downingtown, Pa.									
H	..	F	B	S	D	W	S	3	.....	.....	R	R	80	X
					Sanford Motor Truck Co., Syracuse, N. Y.									
H	SL	SF	B	S	D	C	S	3	36x3½	36x4	R	R	55	..
H	SL	SF	B	S	D	C	S	3	36x3½	36x5	R	R	60	..
					G. A. Schacht Motor Truck Co., Cincinnati, O.									
H	SL	SF	E	S	C	W	S	3	38x3½	38x3½D	R	C	90	..
					Selden Motor Vehicle Co., Rochester, N. Y.									
V	..	..	..	..	D	W	S	3	36x4	36x6	L	C	..	..
V	..	..	..	..	D	W	S	3	36x4	36x6	L	C	..	..
					Speedwell Motor Car Co., Dayton, O.									
T	SL	S	E	S	C	C	S	3	36x4	36x3½D	L	C	70	..
					Standard Motor Truck Co., Warren, O.									
C	SB	S	E	S	D	C	S	3	37x5*	36x5	R	R	65	..
C	SB	S	E	S	D	C	S	3	37x5*	36x5	R	R	65	..
					W. M. Steele, Worcester, Mass.									
C	SB	SF	E	S	D	C	IC	3	38x5	40x4D	R	R	80	E
					Tiffin Wagon Co., Tiffin, O.									
V	SL	SF	B	S	C	C	S	3	.....	.....	L	C	80	..
					Trabold Truck Mfg. Co., Johnstown, Pa.									
H	SB	S	WS	S	D	C	S	3	36x4	38x3D	L	C	90	..
H	SB	S	WS	S	D	W	S	3	36x4	38x3D	L	C	90	..
					Transit Motor Truck Co., Louisville, Ky.									
H	R	SF	M	S	D	C	S	3	36x4	36x4D	R	R	66	..
					United States Motor Truck Co., Cincinnati, O.									
C	SB	F	B	S	C	C	IC	3	3½	3½D	L	C	75	..

Atterbury Model D-W, 6000-lb. Stake, Chassis, $3650.

Chase Model O, 6000-lb. Moving Van, $4400.
Also Panel, $4050; Stake, $3600; Flareboard, $3550.

Crawford 6000-lb. Chassis, $3000.
Also Panel, $3250; Stake, $3150; Flareboard, $3150.

5000 Pound Gasoline Commercial Cars

					O. Armleder Co., Cincinnati, O.									
H	SL	S	B	S	D	C	S	3	40x4	40x3½D	L	C	80	..
H	SL	S	B	S	D	C	S	3	40x4	40x3½D	L	C	80	..
H	SL	S	B	S	D	C	S	3	40x4	40x3½D	L	C	80	..
					Croce Auto Works, Asbury Park, N. J.									
T	R	F	B	S	C	W	S	3	36x5	36x4D	R	R	50	..
					Lange Motor Truck Co., Pittsburgh, Pa.									
H	SB	SF	C	S	D	C	IC	3	36x4	38x6	L	C	70	..
					Martin Carriage Works, York, Pa.									
T	SB	SF	B	S	D	C	S	3	36x4	40x3½D	R	R	60	X
					United States Motor Truck Co., Cincinnati, O.									
C	SB	F	B	S	C	C	IC	3	4	3½D	L	C	75	..

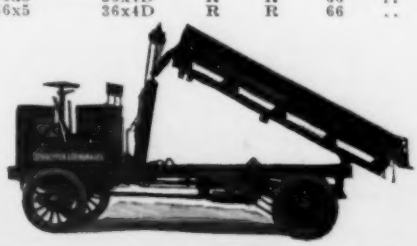
Lange Model B, 5000-lb. Dog Catcher's Body, Chassis, $3000.

6000 Pound Gasoline Commercial Cars

					Atterbury Motor Car Co., Buffalo, N. Y.									
H	SB	SF	B	S	D	W	S	3	36x5	40x5D	L	C	70	..
					Blair Mfg. Co., Newark, O.									
H	SU	SF	B	S	C	W	IC	3	36x4	36x4D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	36x4	36x4D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	36x4	36x4D	..	R	75	X
					Chase Motor Truck Co., Syracuse, N. Y.									
T	H	SF	B	S	D	W	S	4	36x5	36x5D	R	C	83	..
					Coleman Motor Truck Co., Ilion, N. Y.									
H	SL	SF	B	S	C	C	S	3	36x5	36x5D	R	R	74	..
					Crawford Automobile Co., Hagerstown, Md.									
V	SB	S	B	..	C	C	S	3	37x4	37x4D	R	R	75	..
					Driggs-Seabury Ordnance Corp., Sharon, Pa.									
H	SB	SF	B	M	C	C	S	3	36x5	36x4D	R	R	70	..
					Durable Dayton Truck Co., Dayton, O.									
T	O	SF	B	S	D	C	S	3	36x5	36x4	L	C	59	..
					International Motor Co., New York City.									
H	O	SF	B	S	C	C	IC	3	36x5	36x4D	R	R	66	..
H	O	SF	B	S	C	C	IC	3	36x5	36x4D	R	R	66	..

Croce Model C, 5000-lb. Lumber Truck, Chassis, $2600.

Vulcan 6000-lb. Garbage Collection Body, Chassis, $3250.
Made by Driggs-Seabury Ordnance Corp.

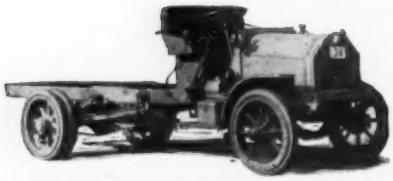


Durable Dayton Model R, 6000-lb. Dump Body, Chassis, $2250.

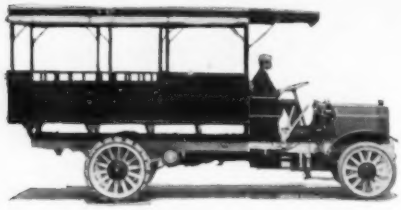
Mack 6000-lb. Canopy Top.
Made by International Motor Co.

BODY DETAILS OF CARS NOT ILLUSTRATED

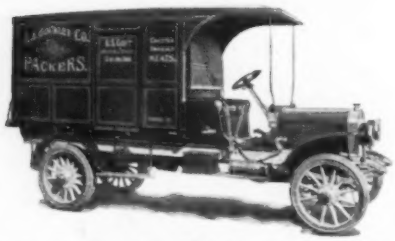
Blair Model D-1, 6000-lb. Stake, $3400.



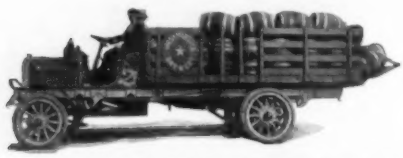
Locomobile 6000-lb. Chassis, $3500.



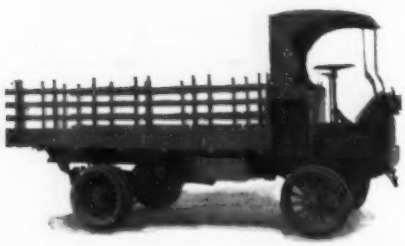
Peerless 6000-lb. Canopy Top, Chassis, $3700.



Rowe Model E-W, 6000-lb. Panel, Chassis, $3400.

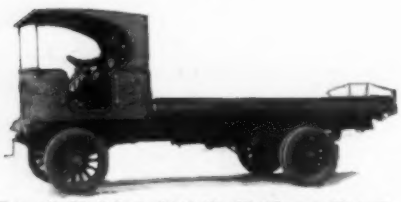


United States Model D, 6000-lb. Slat Side Stake, Chassis, $3200.



King 7000-lb. Stake, Chassis, $3200.

Also Panel, $3350; Stake, $3350; Flareboard, $3550; Hand Dump, $3550; Power Dump, $3750.

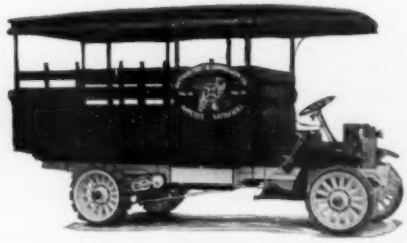


Transit Model T, 7000-lb. Platform, Chassis, $3500.

Also Panel, $3750; Stake, $3750; Flareboard, $3750; Power Dump, $4150.

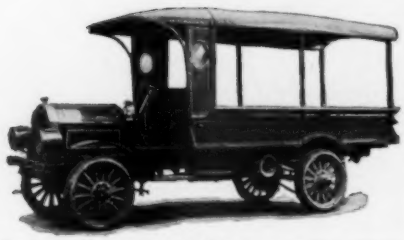
BODY DETAILS OF CARS NOT ILLUSTRATED

Schacht 6000-lb. Flareboard, $3400.



B. A. Gramm's 7000-lb. Canopy Top, Chassis, $3400.

Made by Gramm-Bernstein Co.



Trabold Model H, 6000-lb. Canopy Top, Chassis, $3300.

Also Panel, $3500; Stake, $3450; Flareboard, $3425.

6000 Pound Gasoline Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
			Garford Co., Elyria, O.									
J-3	7050	3500	.....	O	47	13	29	4	4.25	5.25	B	G
			Hurlburt Motor Truck Co., New York City.									
.....	....	3500	.....	O	34	13	29	4	4.25	5.5	B	C
			Knickerbocker Motor Truck Mfg. Co., New York City.									
15-3	5300	3750	.....	120	38	16	32	4	4.5	5.5	P	C
			Locomobile Co. of America, Bridgeport, Conn.									
.....	....	3500	.....	150	43	12	29	4	4.25	6	P	W
			Merchant & Evans Co., Philadelphia, Pa.									
D	6500	3500	S	132	43	15	32	4	4.5	5.5	P	C
			Peerless Motor Car Co., Cleveland, O.									
.....	6200	3700	P, S, F	151	..	15	32	4	4.5	6.5	P	C
			Rowe Motor Mfg. Co., Downingtown, Pa.									
EW	....	3400	.....	156	30	12	29	4	4.25	5	P	C
			G. A. Schacht Motor Truck Co., Cincinnati, O.									
.....	5700	3200	F	150	40	12	29	4	4.25	5.5	B	W
			W. M. Steele, Worcester, Mass.									
B	7600	3000	.....	127	48	10	40	4	5	5	P	C
			Trabold Truck Mfg. Co., Johnstown, Pa.									
H	6800	3300	P, S, F	135	34	14	29	4	4.25	5.5	B	W
			United States Motor Truck Co., Cincinnati, O.									
D	....	3200	.....	144	50	13	32	4	4.5	5.5	P	C
			White Co., Cleveland, O.									
TAD	6500	3700	S	163	37	..	23	4	3.75	5.13	B	G

7000 Pound Gasoline Commercial Cars

			Croce Auto Works, Asbury Park, N. J.									
D	6100	3600	.....	144	36	15	36	4	4.75	5.5	P	W
			Gramm-Bernstein Co., Lima, O.									
.....	6500	3400	.....	48	12	32	4	4.5	5.5	P	C
			Kelly-Springfield Motor Truck Co., Springfield, O.									
K-40	7900	3400	.....	150	36	10	32	4	4.5	6.5	P	C
K-40	7900	3400	.....	172	36	10	32	4	4.5	6.5	P	C
K-40	7900	3400	.....	194	36	10	32	4	4.5	6.5	P	C
K-40	7900	3400	.....	208	36	10	32	4	4.5	6.5	P	C
			A. R. King Mfg. Co., Kingston, N. Y.									
.....	6700	3200	H, P, S, F, D	120	37	12	32	4	4.5	5.5	P	C
			Martin Carriage Works, York, Pa.									
L	7500	3500	.....	150	40	14	36	4	4.75	5.5	P	C
			Royal Motor Truck Co. of N. Y., New York City.									
B	6000	3400	.....	132	36	15	36	4	4.75	5.5	P	C
			Standard Motor Truck Co., Warren, O.									
CX	5800	3200	.....	O	..	14	31	4	4.38	6	P	W
			Transit Motor Truck Co., Louisville, Ky.									
T	5500	3500	P, S, F, D	144	42	12	32	4	4.5	5.5	B	C

8000 Pound Gasoline Commercial Cars

			Blair Mfg. Co., Newark, O.									
E1	6200	3750	P, S, F	121	36	12	32	4	4.5	5.5	P	C
E1	6200	3750	P, S, F	135	36	12	32	4	4.5	5.5	P	C
E1	6200	3750	P, S, F	144	36	12	32	4	4.5	5.5	P	C
			Durable Dayton Truck Co., Dayton, O.									
A	6475	2700	.....	136	44	12	36	4	4.75	5.5	P	G
			Garford Co., Elyria, O.									
K-4	7320	3850	.....	O	47	9	29	4	4.25	5.25	B	G
			Knickerbocker Motor Truck Mfg. Co., New York City.									
15-4	5500	4000	.....	120	38	16	32	4	4.5	5.5	P	C
			Locomobile Co. of America, Bridgeport, Conn.									
.....	....	3650	.....	150	43	12	29	4	4.25	6	P	W
			Peerless Motor Car Co., Cleveland, O.									
.....	6900	4000	P, S, F	151	..	13	32	4	4.5	6.5	P	C
			Speedwell Motor Car Co., Dayton, O.									
Z	6600	3750	P, S, F	115	41	12	40	4	5	5	P	C
			United States Motor Truck Co., Cincinnati, O.									
F	....	3550	.....	168	51	12	32	4	4.5	5.5	P	C

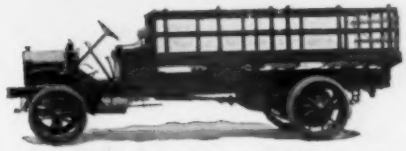
10,000 Pound Gasoline Commercial Cars

			Blair Mfg. Co., Newark, O.									
F	7100	4500	P, S, F	121	36	12	32	4	4.5	5.5	P	C
F	7100	4500	P, S, F	135	36	12	32	4	4.5	5.5	P	C
F	7100	4500	P, S, F	144	36	12	32	4	4.5	5.5	P	C
			Croce Auto Works, Asbury Park, N. J.									
B	7300	4000	.....	144	40	12	36	4	4.75	5.5	P	W

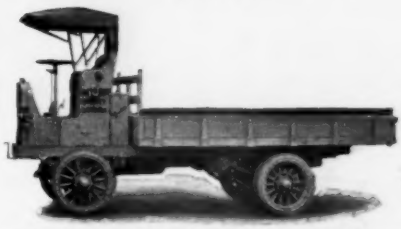
Peerless 8000-lb. Raised Side Stake, Chassis, $4000.

Blair Model E-1, 8000-lb. Ice Body, Chassis, $3750.

Locomobile, 8000-lb. Chassis, $3650.



White Model TAD, 6000-lb. Slat Side Stake, $3850.



Speedwell Model 10-Z, 8000-lb. Flareboard, $3850.
Also Panel, $3850; Stake, $3850.

Blair Model E-1, 8000-lb. Stake, $3900.

Durable Dayton Model A, 8000-lb. Contractor's Body, Chassis, $2700.

Kelly-Springfield Model K-40, 7000-lb. Chassis, $3400.

Croce Model B, 10,000-lb. Coal Truck, Chassis, $4000.

6000 Pound Gasoline Commercial Cars

Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
					Garford Co., Elyria, O.									
V	SP	SF	B	S	C	C	S	3	36x5	40x4D	R	R	75	..
					Hurlburt Motor Truck Co., New York City.									
T	F	F	E	S	D	W	S	3	36x5	36x5D	L	C	..	..
					Knickerbocker Motor Truck Mfg. Co., New York City.									
H	SB	SF	B	S	C	C	S	3	36x5	36x5D	L	L	65	..
					Locomobile Co. of America, Bridgeport, Conn.									
H	SP	S	B	S	C	W	S	4	36x5	36x5D	R	R	79	..
					Merchant & Evans Co., Philadelphia, Pa.									
H	SB	S	B	S	D	C	S	3	36x6	36x5D	R	R	65	..
					Peerless Motor Car Co., Cleveland, O.									
T	SP	S	B	M	C	C	S	4	36x5	40x5D	R	R	74	..
					Rowe Motor Mfg. Co., Downingtown, Pa.									
H	..	F	B	S	D	W	S	3	.....	.....	R	R	80	X
					G. A. Schacht Motor Truck Co., Cincinnati, O.									
H	SL	SF	E	S	C	W	S	3	38x4	40x4D	R	C	90	..
					W. M. Steele, Worcester, Mass.									
C	SB	SF	E	S	D	C	IC	3	38x6	40x5D	R	R	80	E
					Trabold Truck Mfg. Co., Johnstown, Pa.									
H	SB	S	WS	S	D	C	S	3	36x4	38x4D	L	C	90	..
					United States Motor Truck Co., Cincinnati, O.									
C	SB	F	B	S	C	C	IC	3	5	5D	L	C	75	..
					White Co., Cleveland, O.									
H	SP	SF	B	S	D	C	S	4	36x5	40x5D	L	C	..	..

7000 Pound Gasoline Commercial Cars

					Croce Auto Works, Asbury Park, N. J.									
T	R	F	B	S	C	W	S	3	36x5	36x5D	R	R	50	..
					Gramm-Bernstein Co., Lima, O.									
C	SL	SF	B	S	D	W	IC	4	36x5	40x5D	L	C	70	X
					Kelly-Springfield Motor Truck Co., Springfield, O.									
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
					A. R. King Mfg. Co., Kingston, N. Y.									
C	SL	SF	B	S	D	C	IC	3	36x5	36x5D	R	R	65	..
					Martin Carriage Works, York, Pa.									
T	SB	SF	B	S	D	C	S	3	36x5	40x4D	R	R	60	X
					Royal Motor Truck Co. of N. Y., New York City.									
H	SB	F	B	S	D	C	IC	3	36x6	40x5D	R	R	65	..
					Standard Motor Truck Co., Warren, O.									
C	SL	S	B	S	D	W	S	3	36x5	36x5D	R	C	65	..
					Transit Motor Truck Co., Louisville, Ky.									
H	R	SF	M	S	D	C	S	3	36x5	36x5D	R	R	66	..

8000 Pound Gasoline Commercial Cars

					Blair Mfg. Co., Newark, O.									
H	SU	SF	B	S	C	W	IC	3	36x5	36x5D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	36x5	36x5D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	36x5	36x5D	..	R	75	X
					Durable Dayton Truck Co., Dayton, O.									
T	O	SF	B	S	D	C	S	3	36x5	36x4D	L	C	59	..
					Garford Co., Elyria, O.									
V	SP	SF	B	S	C	C	S	3	36x5	40x5D	R	R	46	..
					Knickerbocker Motor Truck Mfg. Co., New York City.									
H	SB	SF	B	S	C	C	S	3	36x5	36x5D	L	L	65	..
					Locomobile Co. of America, Bridgeport, Conn.									
H	SP	S	B	S	C	W	S	4	36x5	36x6D	R	R	79	..
					Peerless Motor Car Co., Cleveland, O.									
T	SP	S	B	M	C	C	S	4	36x5	40x6D	R	R	76	..
					Speedwell Motor Car Co., Dayton, O.									
T	SL	S	E	S	C	C	S	3	36x5	36x5D	L	C	70	..
					United States Motor Truck Co., Cincinnati, O.									
C	SB	F	B	S	C	C	IC	3	5	5D	L	C	75	..

10,000 Pound Gasoline Commercial Cars

					Blair Mfg. Co., Newark, O.									
H	SU	SF	B	S	C	W	IC	3	36x6	36x6D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	36x6	36x6D	..	R	75	X
H	SU	SF	B	S	C	W	IC	3	36x6	36x6D	..	R	75	X
					Croce Auto Works, Asbury Park, N. J.									
T	R	F	B	S	C	C	S	3	36x6	36x6D	R	R	50	..

BODY DETAILS OF CARS NOT ILLUSTRATED

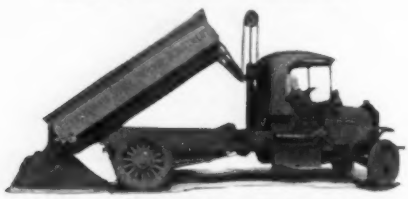
Devon Model D, 6000-lb. Stake, $3750.
Made by Merchant & Evans Co.

B. A. Gramm's 10,000-lb. Dump Body, Chassis, $4300.
Made by Gramm-Berstein Co.

Kelly-Springfield Model K-50, 10,000-lb. Chassis, $4250.

Locomobile 10,000-lb. Slat Side Stake, Chassis, $4500.

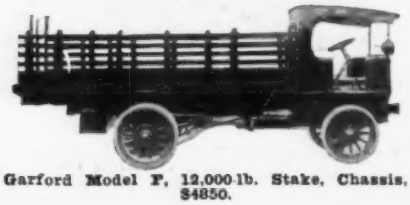
Devon Model G, 10,000-lb. Sided Stake, $3000.
Made by Merchant & Evans Co.



Pierce-Arrow 10,000-lb. Dump Body, Chassis, $4500.
Also Stake, $4800.

Rowe Model G-W, 10,000-lb. Chassis, $4500.

Durable Dayton Model B, 10,000-lb. Stake, Chassis, $3100.



Garford Model F, 12,000-lb. Stake, Chassis, $4850.

White Model ATH, 10,000-lb. Power Dump, $5700.

Vulcan 10,000-lb. Dump Body, Chassis, $4500.
Made by Driggs-Seabury Ordnance Corp.

10,000 Pound Gasoline Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
			Driggs-Seabury Ordnance Corp., Sharon, Pa.									
.....	7450	4500	.....	162	44	11	18	4	3.38	5.5	P	T
			Durable Dayton Truck Co., Dayton, O.									
B	....	3100	.....	148	44	11	44	4	5.25	7	P	C
			Garford Co., Elyria, O.									
D-5	8750	4500	.....	O	45	10	29	4	4.25	5.25	B	G
			Gramm-Bernstein Co., Lima, O.									
.....	8300	4300	.....	168	48	10	41	6	4.13	5.25	T	C
			International Motor Co., New York City.									
.....	8650	....	.....	138	44	14	48	4	5.5	6	P	C
.....	8650	....	.....	198	44	14	48	4	5.5	6	P	C
			Kelly-Springfield Motor Truck Co., Springfield, O.									
K-50	8300	4250	.....	150	36	9	32	4	4.5	6.5	P	C
K-50	8300	4250	.....	172	36	9	32	4	4.5	6.5	P	C
K-50	8300	4250	.....	194	36	9	32	4	4.5	6.5	P	C
K-50	8300	4250	.....	208	36	9	32	4	4.5	6.5	P	C
			Knickerbocker Motor Truck Mfg. Co., New York City.									
15-5	6400	4500	.....	134	38	14	32	4	4.5	5.5	P	C
			Locomobile Co. of America, Bridgeport, Conn.									
.....	9000	4500	.....	140	46	10	40	4	5	6	P	W
.....	9000	4500	.....	170	46	10	40	4	5	6	P	W
			Merchant & Evans Co., Philadelphia, Pa.									
G	7200	2750	S	116	43	10	27	4	4.13	5.25	B	C
			Peerless Motor Car Co., Cleveland, O.									
.....	7600	4500	P, S, F	151	..	11	32	4	4.5	6.5	P	C
			Pierce-Arrow Motor Car Co., Buffalo, N. Y.									
.....	....	4500	S	168	44	14	38	4	4.88	6	P	C
.....	....	4500	S	204	44	14	38	4	4.88	6	P	C
			Rowe Motor Mfg. Co., Downingtown, Pa.									
GW	....	4500	.....	171	38	10	36	4	4.75	5.5	P	C
			Royal Motor Truck Co. of N. Y., New York City.									
A	8500	4500	.....	138	36	12	36	4	4.75	5.5	P	C
			W. M. Steele, Worcester, Mass.									
A	7800	4000	.....	127	48	9	40	4	5	5	P	C
			Transit Motor Truck Co., Louisville, Ky.									
V	6200	4500	P, S, F, D	O	42	11	32	4	4.5	5.5	B	C
			Walter Motor Truck Co., New York City.									
.....	7800	4500	.....	144	33	14	31	4	4.38	6	B	C
			White Co., Cleveland, O.									
TCB	7850	4500	P, S, F	165	37	..	29	4	4.25	5.75	B	G
ATC	....	5200*	D	149	37	..	29	4	4.25	6.38	B	G
ATH	....	5700*	D	157	42	..	43	6	4.25	5.75	B	G

12,000 Pound Gasoline Commercial Cars

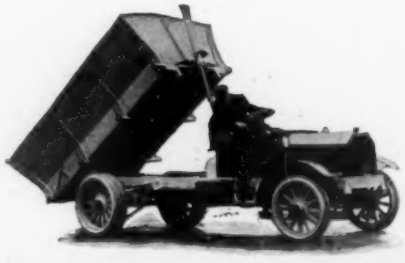
			Durable Dayton Truck Co., Dayton, O.									
L	8850	3500	.....	148	44	10	44	4	5.25	7	P	G
			Garford Co., Elyria, O.									
F6	9200	4850	.....	O	48	9	29	4	4.25	5.25	B	G
			Locomobile Co. of America, Bridgeport, Conn.									
.....	9200	4800	.....	140	46	10	40	4	5	6	P	W
.....	9200	4800	.....	170	46	10	40	4	5	6	P	W
			Speedwell Motor Car Co., Dayton, O.									
X	7200	4400	P, S, F	139	41	10	40	4	5	5	P	C

15,000 Pound Gasoline Commercial Cars

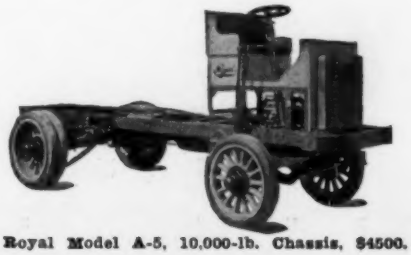
			Durable Dayton Truck Co., Dayton, O.									
E	....	3950	.....	148	44	10	44	4	5.25	7	P	C
			International Motor Co., New York City.									
.....	8900	....	.....	138	44	12	48	4	5.5	6	P	C
.....	8900	....	.....	198	44	12	48	4	5.5	6	P	C

Gasoline Tractors

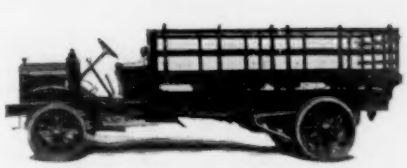
			Knox Motors Co., Springfield, Mass.									
31C	....	3250	.....	139	..	..	40	4	5	5.5	S	C
35	....	....	.....	108	..	..	40	4	5	5.5	P	C
			Walter Motor Truck Co., New York City.									
.....	7500	4500	.....	108	33	10	31	4	4.38	6	B	C



Peerless 10,000-lb. Dump Body, Chassis, $4500.



Royal Model A-5, 10,000-lb. Chassis, $4500.



White Model TCB, 10,000-lb. Slat Side Platform, $4700.

Walter 10,000-lb. Slat Side Platform, Chassis, $4500.

10,000 Pound Gasoline Commercial Cars

Radiator	Carburetor	Lubrication	Ignition	Spark-Plug Size	Clutch	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	% Total Weight on Rear Wheels	Engine Starter
					Driggs-Seabury Ordnance Corp., Sharon, Pa.									
H	SB	SF	B	M	C	C	S	3	36x6	36x6D	R	R	70	..
					Durable Dayton Truck Co., Dayton, O.									
T	O	SF	B	S	D	C	S	3	36x6	42x5	L	C	60	..
					Garford Co., Elyria, O.									
V	SP	SF	B	S	C	C	S	4	36x6	40x6D	R	R	53	..
					Gramm-Bernstein Co., Lima, O.									
C	SB	SF	B	S	D	C	IC	4	36x6	40x6D	L	C	70	X
					International Motor Co., New York City.									
H	O	SF	B	S	C	C	IC	3	36x5	36x5D	R	R	71	..
H	O	SF	B	S	C	C	IC	3	36x5	36x5D	R	R	71	..
					Kelly-Springfield Motor Truck Co., Springfield, O.									
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
C	R	F	E	S	C	C	S	3	.....	.....	L	C	80	..
					Knickerbocker Motor Truck Mfg. Co., New York City.									
H	SB	SF	B	S	C	C	S	3	36x6	36x6D	L	L	65	..
					Locomobile Co. of America, Bridgeport, Conn.									
H	SP	S	B	S	D	C	S	4	40x6	40x6D	R	..	..	..
H	SP	S	B	S	D	C	S	4	40x6	40x6D	R	..	..	..
					Merchant & Evans Co., Philadelphia, Pa.									
H	SB	S	B	S	D	S	S	3	34x3½D	36x7S	R	R	70	..
					Peerless Motor Car Co., Cleveland, O.									
T	SP	S	B	M	C	C	S	4	36x6	42x6D	R	R	77	..
					Pierce-Arrow Motor Car Co., Buffalo, N. Y.									
T	SP	G	B	S	C	W	S	3	36x5	40x6D	R	R	85	..
T	SP	G	B	S	C	W	S	3	36x5	40x6D	R	R	85	..
					Rowe Motor Mfg. Co., Downingtown, Pa.									
H	..	F	B	S	D	W	S	3	.....	.....	R	R	80	X
					Royal Motor Truck Co. of N. Y., New York City.									
H	SB	F	B	S	D	C	IC	3	36x6	40x6D	R	R	65	..
					W. M. Steele, Worcester, Mass.									
C	SB	SF	E	S	D	C	IC	3	38x7	40x6D	R	R	80	E
					Transit Motor Truck Co., Louisville, Ky.									
H	R	SF	M	S	D	C	S	2	36x6	36x6D	R	R	66	..
					Walter Motor Truck Co., New York City.									
C	Z	F	E	M	C	SP	S	4	40x6	40x5D	L	C	66	..
					White Co., Cleveland, O.									
H	SP	SF	B	S	D	C	S	4	36x5	40x6D	L	C	..	..
H	SP	SF	B	S	S	C	S	4	36x5	40x6D	L	C	..	..
H	SP	S	B	S	D	C	S	4	40x10S	48x20S	L	C	..	..

12,000 Pound Gasoline Commercial Cars

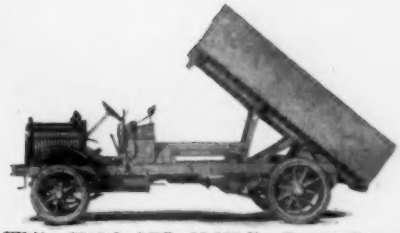
					Durable Dayton Truck Co., Dayton, O.									
T	O	SF	B	S	D	C	S	3	36x7	42x6D	L	C	60	..
					Garford Co., Elyria, O.									
V	SP	SF	B	S	C	C	S	4	36x6	40x7D	R	R	55	..
					Locomobile Co. of America, Bridgeport, Conn.									
H	SP	S	B	S	D	C	S	4	40x7	40x7D	R	..	..	..
H	SP	S	B	S	D	C	S	4	40x7	40x7D	R	..	..	..
					Speedwell Motor Car Co., Dayton, O.									
T	SL	S	E	S	C	C	S	2	36x6	36x6D	L	C	70	..

15,000 Pound Gasoline Commercial Cars

					Durable Dayton Truck Co., Dayton, O.									
T	O	SF	B	S	D	C	S	3	36x7	42x6	L	C	60	..
					International Motor Co., New York City.									
H	O	SF	B	S	C	C	IC	3	36x6	42x6D	R	R	71	..
H	O	SF	B	S	C	C	IC	3	36x6	42x6D	R	R	71	..

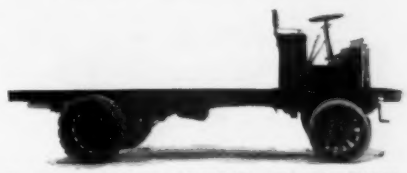
Gasoline Tractors

					Knox Motors Co., Springfield, Mass.									
C	SB	F	B	S	D	C	S	3	34x5	36x5D	R	C	..	O
H	SB	F	B	S	D	C	S	3	36x4	38x6D	L	C	..	E
					Walter Motor Truck Co., New York City.									
C	Z	F	E	M	C	SP	S	4	40x4D	40x4D	L	C	50	..

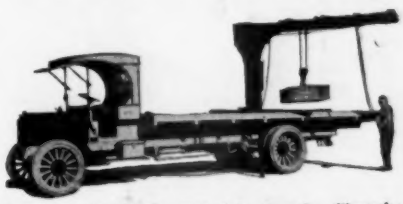


White Model ATC, 10,000-lb. Power Dump, $5200.

Mack 10,000-lb. Stake Platform.
Made by International Motor Co.

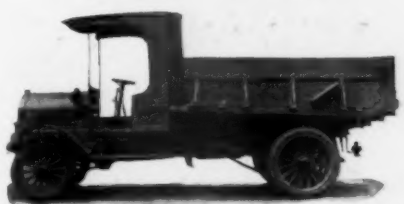


Transit Model V, 10,000-lb. Chassis, $4500.
Also Panel, $4750; Stake, $4750; Flareboard, $4750; Power Dump, $5150.



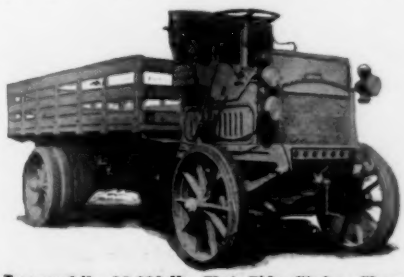
Peerless 12,000-lb. Derrick Truck, Chassis, $5000.

Durable Dayton Model E, 15,000-lb. Chassis, with Trailer, Chassis, $3950.

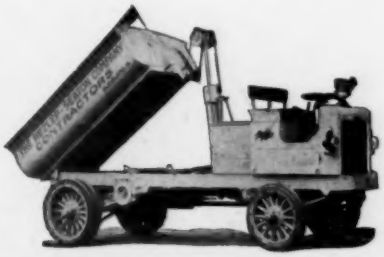


Mack 15,000-lb. Sided Platform
Made by International Motor Co.

Knox Model 31-C Tractor, $3250.



Locomobile 12,000-lb. Slat Side Stake, Chassis, $4800.

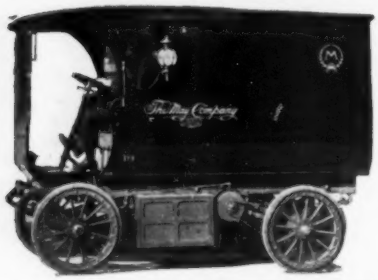


Durable Dayton Model L, 12,000-lb. Dump Body, Chassis, $3500.

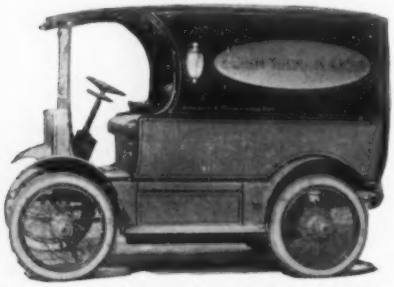
BODY DETAILS OF CARS NOT ILLUSTRATED

Speedwell Model S-X, 12,000-lb. Panel, $4500.
Also Stake, $4500; Flareboard, $4500.

Ward Special 750-lb. Panel, $875.



Baker Model X, 1000-lb. Panel, Chassis, $1900.

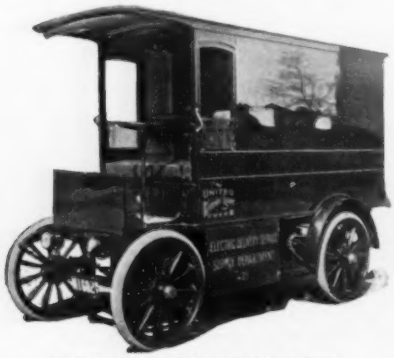


C T 1000-lb. Panel, Chassis, without battery, $1640.

Made by Commercial Truck Co. of America.

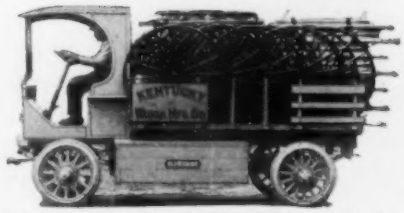
C T 2000-lb. Canopy Top, Chassis, without battery, $2095.

Made by Commercial Truck Co. of America.



Ward Model EA, 2000-lb. Panel.

Baker Model CC, 7000-lb. Stake, Chassis, $3500.



Old Hickory Model 20-W, 2000-lb. Slat Side Stake, Chassis, $1500.

Also Stake, $1570, and Flareboard, $1570. Made by Kentucky Wagon Mfg. Co.

750 Pound Electric Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Mileage Per Charge	Motor Type
Ward Motor Vehicle Co., Mt. Vernon, N. Y.								
WS	2400	875*	P	88	..	12	45	S

1000 Pound Electric Commercial Cars

Baker Motor Vehicle Co., Cleveland, O.								
X	3200	1900	.....	86	36	13	45	S
Commercial Truck Co. of America, Philadelphia, Pa.								
.....	1800	1640	.....	90	34	14	O	S
.....	.....	.....	.....	100	34	14	O	S
General Vehicle Co., Inc., Long Island City, N. Y.								
.....	3695	1950	.....	108	34	15	65	..
.....	3320	1700	.....	85	33	12	45	..
L. G. Schoepflin Co., Buffalo, N. Y.								
A	3000	1275	P, S, F	100	42	18	50	..
Ward Motor Vehicle Co., Mt. Vernon, N. Y.								
EO	3750	....	.....	80	..	12	50	S

1500 Pound Electric Commercial Cars

Kentucky Wagon Mfg. Co., Louisville, Ky.								
15 A	3270	1550	P, F	86	33	13	45	S
L. G. Schoepflin Co., Buffalo, N. Y.								
B	3000	1375	P, S, F	100	42	18	50	..

2000 Pound Electric Commercial Cars

Baker Motor Vehicle Co., Cleveland, O.								
O	4500	2300	.....	102	40	11	40	S
Commercial Truck Co. of America, Philadelphia, Pa.								
.....	2300	2095	.....	100	37	12	O	S
General Vehicle Co., Inc., Long Island City, N. Y.								
.....	4370	2100	.....	103	36	10	45	..
Kentucky Wagon Mfg. Co., Louisville, Ky.								
20W	3000	1500	S, F	110	34	12	40	S
Ward Motor Vehicle Co., Mt. Vernon, N. Y.								
EA	4860	....	P	99	..	10	45	S

3000 Pound Electric Commercial Cars

Kentucky Wagon Mfg. Co., Louisville, Ky.								
30A	4872	1900	F	102	37	10	40	S

4000 Pound Electric Commercial Cars

Baker Motor Vehicle Co., Cleveland, O.								
U	5800	2800	.....	120	42	9	40	S
Commercial Truck Co. of America, Philadelphia, Pa.								
.....	3200	2725	.....	116	36	10	O	S
General Vehicle Co., Inc., Long Island City, N. Y.								
.....	6020	2600	.....	112	41	9	45	..
Ward Motor Vehicle Co., Mt. Vernon, N. Y.								
EB	6450	....	F	111	..	9	40	S

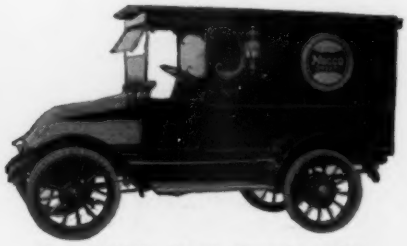
5000 Pound Electric Commercial Cars

Kentucky Wagon Mfg. Co., Louisville, Ky.								
50A	6584	2500	S	118	43	9	40	S

7000 Pound Electric Commercial Cars

Baker Motor Vehicle Co., Cleveland, O.								
CC	8600	3500	.....	137	44	8	40	S
Ward Motor Vehicle Co., Mt. Vernon, N. Y.								
EC	9300	....	SS	127	..	7	35	S

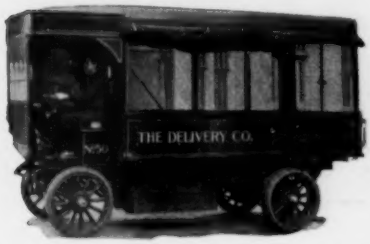
Baker Model O, 2000-lb. Panel, Chassis, $2300.



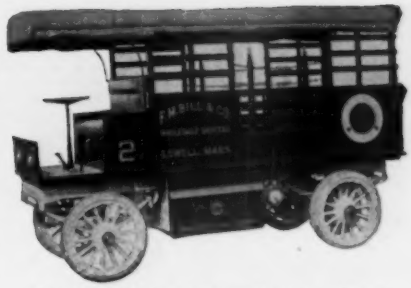
G V 1000-lb. Panel, Chassis, $1950.

Made by General Vehicle Co.

G V 2000-lb. Canopy Top, Chassis, $2100.
Made by General Vehicle Co.



Baker Model U, 4000-lb. Screenside Chassis, $2800.



G V 4000-lb. Covered Slat Side, Chassis, $2600.
Made by General Vehicle Co.

750 Pound Electric Commercial Cars

Battery Make	Battery Capacity	Controller Type	Speeds Forward	Drive	Rear Axle	Front Tires	Rear Tires	Steering and Control	% Total Weight on Rear Wheels
			Ward Motor Vehicle Co., Mt. Vernon, N. Y.						
O	O	..	4	B	S	32x2½	32x2½	L	..

1000 Pound Electric Commercial Cars

			Baker Motor Vehicle Co., Cleveland, O.						
O	O	D	5	C	D	36x3	36x3	R	60
			Commercial Truck Co. of America, Philadelphia, Pa.						
O	O	D	4	SP	D	36x2½	36x3	L	60
O	O	D	4	SP	D	36x2½	36x3	L	60
			General Vehicle Co., Inc., Long Island City, N. Y.						
GV	135	..	5	W	F	36x3	36x3	L	..
GV	135	..	5	C	D	36x2½	36x2½	L	..
			L. G. Schoepflin Co., Buffalo, N. Y.						
P	..	..	4	W	F	34x3	37x3½	L	60
			Ward Motor Vehicle Co., Mt. Vernon, N. Y.						
O	O	D	4	C	D	32x2½	34x3	L	..

1500 Pound Electric Commercial Cars

			Kentucky Wagon Mfg. Co., Louisville, Ky.						
EX	O	D	4	C	D	36x3	36x3	L	60
			L. G. Schoepflin Co., Buffalo, N. Y.						
P	..	..	4	W	F	35x3½	37x3½	L	60

2000 Pound Electric Commercial Cars

			Baker Motor Vehicle Co., Cleveland, O.						
O	O	D	5	C	D	36x3½	36x3½	R	60
			Commercial Truck Co. of America, Philadelphia, Pa.						
O	O	D	4	SP	D	36x3½	36x4	L	60
			General Vehicle Co., Inc., Long Island City, N. Y.						
GV	162	..	5	C	D	36x3½	36x3½	L	..
			Kentucky Wagon Mfg. Co., Louisville, Ky.						
O	O	D	4	W	F	3½	4	L	60
			Ward Motor Vehicle Co., Mt. Vernon, N. Y.						
O	O	D	4	C	D	34x3	36x4	L	..

3000 Pound Electric Commercial Cars

			Kentucky Wagon Mfg. Co., Louisville, Ky.						
EX	O	D	4	C	D	36x3½	36x5	L	60

4000 Pound Electric Commercial Cars

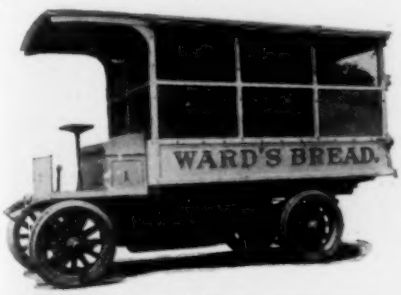
			Baker Motor Vehicle Co., Cleveland, O.						
O	O	D	5	C	D	36x4	36x3D	R	60
			Commercial Truck Co. of America, Philadelphia, Pa.						
O	O	D	4	SP	D	36x5	36x3½D	L	60
			General Vehicle Co., Inc., Long Island City, N. Y.						
GV	216	..	5	C	D	36x4	36x3D	L	..
			Ward Motor Vehicle Co., Mt. Vernon, N. Y.						
O	O	D	4	C	D	36x4	36x6	L	..

5000 Pound Electric Commercial Cars

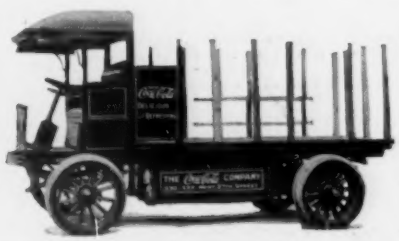
			Kentucky Wagon Mfg. Co., Louisville, Ky.						
EX	O	D	4	C	D	36x4	36x3D	L	60

7000 Pound Electric Commercial Cars

			Baker Motor Vehicle Co., Cleveland, O.						
O	O	D	5	C	D	36x6	38x4D	R	60
			Ward Motor Vehicle Co., Mt. Vernon, N. Y.						
O	O	D	4	C	D	36x6	40x3½D	L	..



Ward Model EC, 7000-lb. Screen Side.



C T 4000-lb. Stake, Chassis, without battery, $2725.
Made by Commercial Truck Co. of America.

G V 1000-lb. Panel, Chassis, $1700.
Made by General Vehicle Co.

Ward Model EO, 1000-lb. Panel.

Ward Model EB, 4000-lb. Flareboard.

BODY DETAILS OF CARS NOT ILLUSTRATED

Schoepflin Model A, 1000-lb. Panel, $1350; Chassis, $1275.
Also Stake, $1300, and Flareboard, $1300.

Urban Model 15 A, 1500-lb. Panel, $1925; Chassis, $1550.
Also Flareboard, $1800.
Made by Kentucky Wagon Mfg. Co.

Schoepflin Model B, 1500-lb. Panel, $1500; Chassis, $1375.
Also Stake, $1475, and Flareboard, $1475.

Urban Model 30A, 3000-lb. Flareboard, Chassis, $1900.
Made by Kentucky Wagon Mfg. Co.

Urban Model 50A, 5000-lb. Stake, Chassis, $2500.
Made by Kentucky Wagon Mfg. Co.

Baker Model EA, 10,000-lb. Stake, Chassis, $3850.

C T 10,000-lb. Stake, Chassis, without battery, $3935.
Made by Commercial Truck Co. of America.

Stanley Model 719, 2500-lb. Panel, $1800.
Also Model 814, Express, $2300.

BODY DETAILS OF CARS NOT ILLUSTRATED
Urban Model 80A, 8000-lb. Stake, Chassis, $3000.
Made by Kentucky Wagon Mfg. Co.

7000 Pound Electric Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Height of Loading Platform	Maximum Speed	Mileage Per Charge	Motor Type
			Commercial Truck Co. of America, Philadelphia, Pa.					
.....	4800	3530	.....	115	42	9	O	S
			General Vehicle Co., Inc., Long Island City, N. Y.					
.....	8225	3250	.....	128	42	8	40	..

8000 Pound Electric Commercial Cars

			Kentucky Wagon Mfg. Co., Louisville, Ky.					
80A	8730	3000	S	130	45	8	35	S

10,000 Pound Electric Commercial Cars

			Baker Motor Vehicle Co., Cleveland, O.					
EA	9500	3850	.....	137	46	7	35	S
			Commercial Truck Co. of America, Philadelphia, Pa.					
.....	5700	3935	.....	132	43	7	O	S
			General Vehicle Co., Inc., Long Island City, N. Y.					
.....	9300	3700	.....	139	42	7	35	..
			Ward Motor Vehicle Co., Mt. Vernon, N. Y.					
ED	12750	....	.....	159	..	6	35	S

1500 Pound Steam Commercial Cars

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Wheelbase	Maximum Speed	Horse Power	Cylinders	Bore	Stroke
			Stanley Motor Carriage Co., Newton, Mass.						
719	2500	1425	P	126	30	20	2	4	5

2500 Pound Steam Commercial Cars

			Stanley Motor Carriage Co., Newton, Mass.						
814	3800	2100	E	136	30	30	2	4.5	6.5

Alphabetical Index of Commercial Car Manufacturers Buyers' Reference Review

Maker — Page

GASOLINE CARS

Adams Bros. Co. 22, 24, 26
O. Armleder Co. 22, 24, 26, 28
Atterbury Motor Car Co. 20, 22, 26, 28
Auglaize Motor Car Co. 20, 24
Autocar Co. 24

C. L. Barker 22, 26
Bessemer Motor Truck Co. 22, 24, 26
Bingham Mfg. Co. 20
Blair Mfg. Co. 26, 28, 30
Bowling Green Motor Truck Co. 22, 24
Brockway Motor Truck Co. 20, 24, 26
Burrows Cyclecar Co. 20

Chase Motor Truck Co. 20, 24, 28
Coleman Motor Truck Co. 22, 26, 28
Corbitt Automobile Co. 26
Crawford Automobile Co. 28
Croce Auto Works 20, 28, 30

Delahunty Dyeing Machine Co. 24
Driggs-Seabury Ordnance Corp. 26, 28, 32
Durable Dayton Truck Co. 26, 28, 30, 32
Duryea Laboratories 20

Gabriel Auto Co. 20, 24
Garford Co. 26, 30, 32
Gramm-Bernstein Co. 22, 26, 30, 32
Gramm Motor Truck Co. 22

Hurlburt Motor Truck Co. 22, 26, 30

International Motor Co. 22, 26, 28, 32

Maker — Page

Kearns Motor Truck Co. 20
Kelly-Springfield Motor Truck Co. 24, 26, 30, 32
Kentucky Wagon Mfg. Co. 24
A. R. King Mfg. Co. 30
Knickerbocker Motor Truck Mfg. Co. 30, 32
Knox Motors Co. 32
H. J. Koehler S. G. Co. 22
Krebs Commercial Car Co. 22, 26

Lange Motor Truck Co. 24, 28
Lauth-Juergens Motor Car Co. 26
Lippard-Stewart Motor Car Co. 20, 22, 24, 26
Locomobile Co. of America 30, 32
Lord Baltimore Motor Truck Co. 22, 28
Ludlow Auto Engineering Co. 20

Maccarr Truck Co. 22, 24, 28
Martin Carriage Works 22, 24, 28, 30
Maxim Motor Co. 24, 28
Merchant & Evans Co. 30, 32
Motokart Co. 20

Palmer-Moore Co. 22
Peerless Motor Car Co. 30, 32
Pierce-Arrow Motor Car Co. 28, 32

Rowe Motor Mfg. Co. 24, 28, 30, 32
Royal Motor Truck Co. of N. Y. 30, 32

Sanford Motor Truck Co. 20, 28
G. A. Schacht Motor Truck Co. 28, 30
Selden Motor Vehicle Co. 24
Speedwell Motor Car Co. 28, 30, 32
Standard Motor Truck Co. 24, 26, 28, 30

Maker — Page

W. M. Steele 28, 30, 32
Stewart Motor Corp. 20
Sullivan Motor Car Co. 24

Tegetmeier & Riepe Co. 26
Tiffin Wagon Co. 20, 24, 28
Touraine Co. 20
Trabold Truck Mfg. Co. 24, 28, 30
Transit Motor Truck Co. 24, 28, 30, 32
Trumbull Motor Car Co. 20
Twombly Car Corp. 20

United States Motor Truck Co. 28, 30

Walter Motor Truck Co. 32
White Company 22, 26, 30, 32
Willys-Overland Co. 20

ELECTRIC CARS

Baker Motor Vehicle Co. 34, 36
Buffalo Electric Vehicle Co. 34
Commercial Truck Co. of America 34, 36
General Vehicle Co., Inc. 34, 36
Kentucky Wagon Mfg. Co. 34, 36
L. G. Schoepflin Co. 34
Ward Motor Vehicle Co. 34, 36

STEAM CARS

Stanley Motor Carriage Co. 36

7000 Pound Electric Commercial Cars

Battery Make	Battery Capacity	Controller Type	Speeds Forward	Drive	Rear Axle	Front Tires	Rear Tires	Steering and Control	% Total Weight on Rear Wheels
Commercial Truck Co. of America, Philadelphia, Pa.									
O	O	D	4	SP	D	36x3½D	36x4D	L	..
General Vehicle Co., Inc., Long Island City, N. Y.									
GV	270	..	5	C	D	36x6	36x3½D	L	..

8000 Pound Electric Commercial Cars

Kentucky Wagon Mfg. Co., Louisville, Ky.									
EX	O	D	4	C	D	36x5	40x5D	L	60

10,000 Pound Electric Commercial Cars

Baker Motor Vehicle Co., Cleveland, O.									
O	O	D	5	C	D	36x7	38x5D	R	60
Commercial Truck Co. of America, Philadelphia, Pa.									
O	O	D	4	SP	D	36x4D	36x5D	L	..
General Vehicle Co., Inc., Long Island City, N. Y.									
GV	324	..	5	C	D	36x7	36x5D	L	..
Ward Motor Vehicle Co., Mt. Vernon, N. Y.									
O	O	D	4	C	D	40x3½D	42x5D	L	..

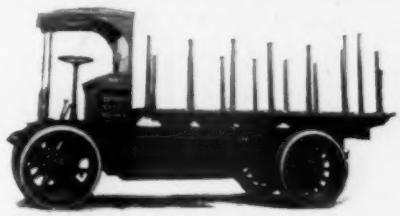
1500 Pound Steam Commercial Cars

Motor Mounting	Motor Type	Revolutions Per Minutes	Pressure	Boiler Type	Boiler Location	Fuel	Drive	Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers
Stanley Motor Carriage Co., Newton, Mass.												
H	N	900	600	FT	H	K	S	F	34x4½*	34x4½*	R	R

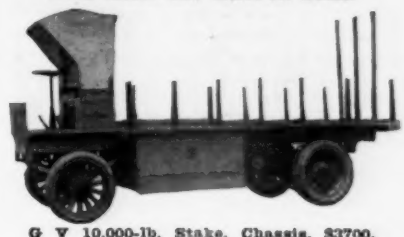
2500 Pound Steam Commercial Cars

Stanley Motor Carriage Co., Newton, Mass.												
H	N	900	600	FT	H	K	S	F	36x5*	36x5*	R	R

C T 7000-lb. Slat Side Stake, Chassis, without battery, $3550.
Made by Commercial Truck Co. of America.



Ward Model ED, 10,000-lb. Stake.



G V 10,000-lb. Stake, Chassis, $3700.
Made by General Vehicle Co.

Gasoline, Electric and Steam Commercial Cars Indexed According to Chassis Price

* Indicates Price Complete With Body

Pr.	H.P.	Cyl.	Maker.	Page
500 Pound Commercial Cars				
295*	9	2	Burrows Cyclecar Co.	20
365*	11	2	Motokart Company	20
395	13	4	Trumbull Motor Car Co.	20
475*	12	4	Kearns Motor Truck Co.	20
750*	16	4	Twombly Car Corp.	20
600 Pound Commercial Cars				
350	9	2	Ludlow Auto Engineering Co.	20
750 Pound Commercial Cars				
875*	Electric.		Ward Motor Vehicle Co.	34
800 Pound Commercial Cars				
895*	26	4	Willys-Overland Co.	20
1000 Pound Commercial Cars				
600	19	2	Duryea Laboratories	20
639	15	4	Touraine Co.	20
1200	20	4	Gabriel Auto. Co.	20
1275	Electric.		L. G. Schoepflin Co.	34
1640	Electric.		Commercial Truck Co. of America.	34
1700	Electric.		General Vehicle Co., Inc.	34
1900	Electric.		Baker Motor Vehicle Co.	34
1950	Electric.		General Vehicle Co., Inc.	34
1500 Pound Commercial Cars				
950	*30	2	Auglaize Motor Car Co.	20
1200	20	4	Sanford Motor Truck Co.	20
1305	20	4	Brockway Motor Truck Co.	20
1350	27	4	Gramm Motor Truck Co.	22
1375	Electric.		L. G. Schoepflin Co.	34
1435	Steam.		Stanley Motor Carriage Co.	36
1500	20	4	Stewart Motor Corp.	20
1500	20	4	Chase Motor Truck Co.	20
1550	Electric.		Kentucky Wagon Mfg. Co.	34
1600	23	4	Croce Auto Works	20
1600	23	4	Gabriel Auto Co.	20
1600	23	4	Tiffin Wagon Co.	20
1650	23	4	Lippard-Stewart Motor Car Co.	20
1750	23	4	Lippard-Stewart Motor Car Co.	20
1800	20	4	Atterbury Motor Car Co.	20
2100	23	4	White Co.	22
2200	Electric.		Buffalo Electric Vehicle Co.	34
1600 Pound Commercial Cars				
1350	*23	3	Palmer-Moore Co.	22
2000 Pound Commercial Cars				
725	22	2	H. J. Koehler S. G. Co.	22
1250	20	4	Bessemer Motor Truck Co.	22
1250	20	4	Trabold Truck Mfg. Co.	24
1500	23	4	Hurlburt Motor Truck Co.	22
1500	Electric.		Kentucky Wagon Mfg. Co.	34
1700	26	4	Standard Motor Truck Co.	24
1750	23	4	Bowling Green Motor Truck Co.	22
1750	23	4	Gramm-Bernstein Co.	22
1850	23	4	Adams Bros. Co.	22
1900	26	4	Standard Motor Truck Co.	24
1900	23	4	Krebs Commercial Car Co.	22
1900	27	4	Maccarr Truck Co.	22
2000	26	4	C. L. Barker	22
2000	23	4	Coleman Motor Truck Co.	22
2000	23	4	Lippard-Stewart Motor Car Co.	22
2000	23	4	Lord Baltimore Motor Truck Co.	22
2000	32	4	Transit Motor Truck Co.	24
2000	23	4	Tiffin Wagon Co.	24
2050	26	4	Martin Carriage Works	22
2095	Electric.		Commercial Truck Co. of America.	34
2100	23	4	Atterbury Motor Car Co.	22
2100	Electric.		General Vehicle Co., Inc.	34
2200	27	4	O. Armleder Co.	22
2300	Electric.		Baker Motor Vehicle Co.	34
2400	Electric.		Buffalo Electric Vehicle Co.	34
2500 Pound Commercial Cars				
1350	23	4	Brockway Motor Truck Co.	24
1940	23	4	Brockway Motor Truck Co.	24
2100	Steam.		Stanley Motor Carriage Co.	36
1600	23	4	Sullivan Motor Car Co.	24
1700	23	4	Auglaize Motor Car Co.	24
1750	27	4	Delahunty Dyeing Machine Co.	24
1800	27	4	Bessemer Motor Truck Co.	24
1800	27	4	Bowling Green Motor Truck Co.	24
1800	36	4	Standard Motor Truck Co.	26
1850	18	2	Autocar Co.	24
1900	23	4	Kentucky Wagon Mfg. Co.	24
1900	Electric.		Kentucky Wagon Mfg. Co.	34
2000	23	4	Selden Motor Vehicle Co.	24
2000	23	4	Kelly-Springfield Motor Truck Co.	24
2000	27	4	Bowling Green Motor Truck Co.	24
2000	23	4	Tegetmeier & Riepe Co.	26
2100	26	4	Standard Motor Truck Co.	26
2150	27	4	Maccarr Truck Co.	24
2150	26	4	Martin Carriage Works	24
2150	32	4	O. Armleder Co.	24
2200	27	4	Chase Motor Truck Co.	24
2250	23	4	Lange Motor Truck Co.	24
2300	27	4	Adams Bros. Co.	24
2300	27	4	Gabriel Auto Co.	24
2300	27	4	Lippard-Stewart Motor Car Co.	24
2450	23	4	Rowe Motor Mfg. Co.	24
2500	27	4	Gabriel Auto Co.	24
3000	23	4	White Co.	26
3000 Pound Commercial Cars				
1600	23	4	Sullivan Motor Car Co.	24
1700	23	4	Auglaize Motor Car Co.	24
1750	27	4	Delahunty Dyeing Machine Co.	24
1800	27	4	Bessemer Motor Truck Co.	24
1800	27	4	Bowling Green Motor Truck Co.	24
1800	36	4	Standard Motor Truck Co.	26
1850	18	2	Autocar Co.	24
1900	23	4	Kentucky Wagon Mfg. Co.	24
1900	Electric.		Kentucky Wagon Mfg. Co.	34
2000	23	4	Selden Motor Vehicle Co.	24
2000	23	4	Kelly-Springfield Motor Truck Co.	24
2000	27	4	Bowling Green Motor Truck Co.	24
2000	23	4	Tegetmeier & Riepe Co.	26
2100	26	4	Standard Motor Truck Co.	26
2150	27	4	Maccarr Truck Co.	24
2150	26	4	Martin Carriage Works	24
2150	32	4	O. Armleder Co.	24
2200	27	4	Chase Motor Truck Co.	24
2250	23	4	Lange Motor Truck Co.	24
2300	27	4	Adams Bros. Co.	24
2300	27	4	Gabriel Auto Co.	24
2300	27	4	Lippard-Stewart Motor Car Co.	24
2450	23	4	Rowe Motor Mfg. Co.	24
2500	27	4	Gabriel Auto Co.	24
3000	23	4	White Co.	26
4000 Pound Commercial Cars				
1700	23	4	Lauth-Juergens Motor Car Co.	26
1750	23	4	Lauth-Juergens Motor Car Co.	26
1800	29	4	Durable Dayton Truck Co.	26
1875	27	4	Brockway Motor Truck Co.	26
1910	29	4	Sanford Motor Truck Co.	26
2000	22	4	Corbitt Automobile Co.	26
2000	26	4	Standard Motor Truck Co.	26
2125	27	4	Brockway Motor Truck Co.	26

(*Continued on following page*)

Gasoline, Electric and Steam Commercial Cars Indexed According to Chassis Price (Continued From Page 36a)

Pr.	H.P.	Cyl.	Maker.	Page
2150	32	4	O. Armleder Co.	36
2200	27	4	Bowmar Motor Truck Co.	33
2250	27	4	Krebs Commercial Car Co.	33
2400	36	4	C. L. Barker	33
2400	27	4	Maccarr Truck Co.	33
2425	32	4	Coleman Motor Truck Co.	33
2450	27	4	Trubold Truck Mfg. Co.	33
2500	27	4	Lord Baltimore Motor Truck Co.	33
2500	27	4	Adams Bros. Co.	33
2500	27	4	W. M. Steele	33
2500	27	4	United States Motor Truck Co.	33
2600	32	4	Grasm-Bernstein Co.	35
2600	Electric.		General Vehicle Co., Inc.	34
2600	27	4	Lippard-Stewart Motor Car Co.	36
2700	27	4	Tiffin Wagon Co.	35
2725	Electric.		Commercial Truck Co. of America	34
2750	18	4	Driggs-Seabury Ordnance Corp.	36
2750	32	4	Kelly-Springfield Motor Truck Co.	36
2800	Electric.		Baker Motor Vehicle Co.	34
2800	27	4	Atterbury Motor Car Co.	36
2800	25	4	Rowe Motor Mfg. Co.	36
2800	20	4	G. A. Schacht Motor Truck Co.	36
2850	27	4	Blair Mfg. Co.	36
2850	27	4	Speedwell Motor Car Co.	36
2850	32	4	Transit Motor Truck Co.	36
2900	20	4	Garford Co.	36
2900	27	4	Hurlburt Motor Truck Co.	36
2900	25	4	Pierce-Arrow Motor Car Co.	36

5000 Pound Commercial Cars

2200	32	4	O. Armleder Co.	36
2250	Electric.		Kentucky Wagon Mfg. Co.	34
2600	36	4	Croce Auto Works	36
2750	27	4	United States Motor Truck Co.	33
2800	20	4	Martin Carriage Works	33
2900	27	4	Lange Motor Truck Co.	36

6000 Pound Commercial Cars

2250	36	4	Durable Dayton Truck Co.	32
3000	32	4	Crawford Automobile Co.	32
3000	27	4	Coleman Motor Truck Co.	33
3000	40	4	W. M. Steele	33
3000	20	4	G. A. Schacht Motor Truck Co.	33
3000	32	4	United States Motor Truck Co.	33
3000	32	4	Blair Mfg. Co.	33
3000	18	4	Driggs-Seabury Ordnance Corp.	33
3000	20	4	Trubold Truck Mfg. Co.	33
3000	32	4	Chase Motor Truck Co.	33
3000	20	4	Rowe Motor Mfg. Co.	33
3000	20	4	Garford Co.	33
3000	20	4	Hurlburt Motor Truck Co.	33
3000	20	4	Locomobile Co. of America	33
3000	32	4	Merchant & Evans Co.	33
3000	32	4	Atterbury Motor Car Co.	33
3000	32	4	Pierless Motor Car Co.	33
3000	32	4	White Co.	33
3000	32	4	Knickerbocker Motor Truck Mfg. Co.	33

7000 Pound Commercial Cars

3000	32	4	A. R. King Mfg. Co.	33
3000	32	4	Standard Motor Truck Co.	33
3250	Electric.		General Vehicle Co., Inc.	34
3400	32	4	Grasm-Bernstein Co.	35
3400	32	4	Kelly-Springfield Motor Truck Co.	33
3400	36	4	Royal Motor Truck Co. of N. Y.	33
3500	36	4	Martin Carriage Works	33
3500	Electric.		Baker Motor Vehicle Co.	34
3500	32	4	Transit Motor Truck Co.	36
3520	Electric.		Commercial Truck Co. of America	34
3600	36	4	Croce Auto Works	36

8000 Pound Commercial Cars

2700	36	4	Durable Dayton Truck Co.	32
3000	Electric.		Kentucky Wagon Mfg. Co.	34
3250	32	4	United States Motor Truck Co.	33
3600	20	4	Locomobile Co. of America	33
3750	32	4	Blair Mfg. Co.	33
3750	40	4	Speedwell Motor Car Co.	33
3800	20	4	Garford Co.	33
4000	32	4	Knickerbocker Motor Truck Mfg. Co.	33
4000	32	4	Pierless Motor Car Co.	33

10,000 Pound Commercial Cars

1375	Electric.		L. G. Schneplin Co.	34
2750	27	4	Merchant & Evans Co.	33
3300	44	4	Durable Dayton Truck Co.	32
3700	Electric.		General Vehicle Co., Inc.	34
3850	Electric.		Baker Motor Vehicle Co.	34
3925	Electric.		Commercial Truck Co. of America	34
4000	40	4	W. M. Steele	33
4000	36	4	Croce Auto Works	36
4000	32	4	Kelly-Springfield Motor Truck Co.	33
4000	41	6	Grasm-Bernstein Co.	35
4000	32	4	Blair Mfg. Co.	33
4000	40	4	Locomobile Co. of America	33
4000	32	4	Transit Motor Truck Co.	33
4000	36	4	Royal Motor Truck Co. of N. Y.	33
4000	36	4	Pierce-Arrow Motor Car Co.	33
4000	32	4	Pierless Motor Car Co.	33
4000	18	4	Driggs-Seabury Ordnance Corp.	33
4000	20	4	Garford Co.	33
4000	31	4	Walter Motor Truck Co.	33
4000	32	4	Knickerbocker Motor Truck Mfg. Co.	33
4000	32	4	White Co.	33
4000	36	4	Rowe Motor Mfg. Co.	33
5250*	20	4	White Co.	33
5700*	43	6	White Co.	33

12,000 Pound Commercial Cars

3300	44	4	Durable Dayton Truck Co.	32
4400	40	4	Speedwell Motor Car Co.	33
4800	40	4	Locomobile Co. of America	33
4850	20	4	Garford Co.	33

15,000 Pound Commercial Cars

3850	44	4	Durable Dayton Truck Co.	32

Gasoline Tractors

3250	40	4	Knox Motors Co.	33
4500	31	4	Walter Motor Truck Co.	33

TO SOLVE THE USED-CAR PROBLEM

By C. L. EDHOLM

Plans are well under way in Los Angeles to form an association of motor truck dealers in order to solve the problem of the used car, one of the principle handicaps in carrying on the business of selling motor vehicles. Twelve leading dealers have agreed on the tentative plans which will shortly go into effect with such modifications as may be deemed advisable. The nub of the propositon is a clearing house for such cars as are taken in trade, with an expert in used cars who shall appraise each second hand machine, fixing the price at which it shall be taken to sell by the association and this price is also the amount which the dealer shall allow for it in selling a new car. The latter rule is not iron bound however: that is, the dealer may allow his customer an excess of that sum, but it is a matter of private arrangement, a loss which the dealer must absorb in some way, as the clearing house will sell the car at the appraiser's figure.

Still more advantageous for the dealer is the development of a fund which will be available for the members, and from which an amount equal to 50 per cent. of the appraiser's figure may be borrowed on second hand cars taken over by the clearing house. This will be a good investment for capital which will be secured from intelligent investors who have a knowledge of the motor truck business and realize its essential soundness. To a certain extent it will perform the functions which the banks should undertake. Twelve leading motor truck dealers are back of this new organization, capital is promised and the plan is well on the way toward realization.

A very desirable feature of the selling organization is the removal of the used car from the agency which is handling new machines. Salesmen cannot take the same interest in disposing of the old cars and perhaps it should not be expected of them. The second hand machine may be of another make with which the salesman is not familiar, which he cannot recommend with the same enthusiasm and faith that goes into his "selling talk" in behalf of his own make of car; and of course a used machine cannot be guaranteed with the same confidence as a new car.

In short, the selling of second hand machines is a profession in itself, requires a very extensive knowledge of many makes of motor vehicles, and a special knowledge regarding the merits of the particular machine offered. This is the qualification of the salesman that will be employed in the new clearing house.

The advantage of a selling organization for the used cars taken in trade by many dealers is that a man who is in the market for a second hand car will know that he can find a large variety to select from, and that instead of having to take something that will do, because nothing better is offered, he can be pretty sure of finding just the sort of used car he desires. Then the system of having the price fixed by an impartial appraiser will remove much of the element of uncertainty from the purchase of a machine that has had service.

At present it is not contemplated to rebuild the cars before selling, but to secure estimates on the contemplated work for the benefit of the purchaser, and where possible to have the repairs or rebuilding done by the local agency of the machine that requires attention. In short, the system is broad enough to work for the best interests of all concerned, the buyer and seller alike.

Working on a similar principle is the method used by M. S. Bulkley, agent of the Autocar, which has proved one of the most successful machines handled in Southern California. Mr. Bulkley's early experience was that of many dealers to-day.

Taking in trade cars of various makes, which had seen more or less service, the machines gradually accumulated for the reason that the salesmen preferred to devote their efforts to selling new trucks, and also for the reason that in order to close deals with particularly good firms that might prove valuable customers later on, it sometimes happened that old cars were taken at a valuation above what they would bring. Finally when the agent realized that these cars were more in the nature of an incumbrance than an asset, he decided to systematize his second-hand car department. An expert in that game was employed, a man who knew the different makes of trucks, and a keen appraiser of values. To him were referred all transactions that included the taking over of old machines in selling new ones. His appraisment was considered final, and in order to keep his natural conservatism unimpaired, his remuneration was arranged on a basis of commissions on the used cars sold; with a moderate drawing account to go on. The department was kept quite independent of the other branches of the business, and only in exceptional cases was the chief called upon to settle differences between the too optimistic salesman and the conservative used car expert.

This system has worked out well, with that branch of the business breaking even; which is about as much as can be expected of the second hand car department.

The former system of going to considerable expense in rebuilding and overhauling old cars was abandoned, as it was found that the cost of mechanical improvements alone was sometimes greater than the price that could be secured, to say nothing of the value allowed in taking the machine in the first place. Instead of doing the work before selling, it is now customary to sell the machine as it is taken in, and give the buyer a fair estimate on such changes as are desired.

A certain advertising value was secured from a couple of cars of the same make which had been sold 5 years previously and had been in constant service ever since. These veterans were rebuilt by the agent and put into commission as service cars in his own establishment; the fact that they had stood the hard usage of 5 years being made public, and forming a telling demonstration of the durability of this make of car.

The CCJ has most readers because it gives most information

Motor Trucks Create Great Business

Baking Company Developed From Home Bakery in Suburban New York, in Seven Years Makes Distribution Over Sixty-Mile Section of Western End of Long Island

LOCATION is assumed to be a very important factor in business, especially when the products are perishable, but delivery is also important when one wishes to serve his patrons to the best advantage and is anxious to create and preserve custom. One of the most interesting illustrations of what has been accomplished practically through automobile delivery is that of the Dillman Baking Company, located at Richmond Hill, L. I., a suburb of greater New York, between Brooklyn and Jamaica, which is close to the Woodhaven Junction station of the Long Island railroad.

Seven years ago a little home bakery was established in a cottage at Woodhaven Junction, and the products were distributed through the village by a push cart delivery. To-day this concern has a splendid plant, equipped with the finest machinery, with every facility for producing bread, and distribution is 35 miles east on Long Island, throughout Brooklyn and the villages that are south of that borough, and has been extended to Staten Island. From east to west the distributing area is more than 60 miles, and from north to south practically the width of Long Island is covered, while the Bronx section of greater New York has also been considerably developed. Covering the territory, the company does what would be impossibe with any other means of distribution, but the limitations have by no means been reached, and there is every reason to believe that there will be continued extension of operations.

Brooklyn is practically at the west end of Long Island, and while what was the old city is along the East river, across from Manhattan Island, at the south is Coney Island and Jamaica bay. Extending from the south shore westerly toward Coney Island is a narrow neck or arm that is known as Rockaway beach, and from this arm extending easterly for perhaps 30 miles in a series of islands. To reach Coney Island through Brooklyn one must circle the west side of Jamaica bay, and to reach Rockaway beach one must circle the east side.

Location Advantageous for Distribution

Jamaica is directly north of Jamaica bay, approximately midway between Jamaica bay and Long Island sound, and from Jamaica several main highways radiate like the fingers of a hand, one to and along the south shore, another that reaches the north shore at Huntington, and between these are two that afford communication between some of the island villages. Another that may be regarded as the thumb, goes directly north to Flushing. From Jamaica another road leads to Long Island City and thence there is access to Manhattan Island by the Queensboro bridge.

Richmond Hill is west of Jamaica, and this location is made up of a number of villages, most of which are along the line of the Long Island railroad. The Dillman Baking Company plant is in what is practically a residential section, and it is about 3 miles west and slightly south of Jamaica. Geographically, the location is excellent for long distance delivery, for there is access direct to practically every main highway, and along these at short intervals are numerous villages that are rapidly increasing in population, and which are generally on the lines of railroads.

Delivery a Large Factor for Custom

It would seem that the very well systematized railroad facilities would stimulate delivery from New York City, but this is not the case. The tendency is to purchase in the villages where the shops and stores are expected to afford such service as might hardly be expected in communities of such size.

Quality has also been one of the several reasons for the success of the Dillman Baking Company, this being one of the first companies to put its product up in oiled paper, so that it is thoroughly protected and would dry more slowly, reserving the crispness of the bread for a considerably longer time. The business increased, a new location was sought, and the present plant developed, it is now operating 24 hours a day, and producing many thousands of loaves.

Bread is very perishable, because the general demand is that it be fresh, and practical business from a baker's viewpoint is to have the order of the customer who can be reached but once a day, delivered as early as possible after the opening of his store. This gives the big problem of delivering to all in a comparatively few hours of the early morning.

Some of the Delivery Problems

One method would appear to be short routes, light loads and fast vehicles, but this could only apply to a comparatively limited area, for as the routes lengthen and the loads are increased, the speed must necessarily be decreased, and there is the time factor that must be regarded. Shipments can be sent considerable distances by express, provided that there are means of distribution at the point to which the goods are shipped, but the shipping expense must be taken from the profits, for custom has standardized the price of bread and this cannot be exceeded. Not only this, railroad schedules are not sufficiently dependable to justify a business in which there is keen competition risking its trade upon them, and, as a rule, there are not a sufficient number of late night or early morning trains to serve any given locality, even in New York City.

No bakery can serve any specific territory to the exclusion of competitors, and, of course, delivery equipment in excess of actual requirements would be an unnecessary expense, so the distribution problem that must be practically dealt with is to fill all orders within the comparatively few

Part of the Dillman Bakery Fleet

These cars have permitted a small store to extend its delivery territory over nearly all Long Island and part of New York City itself

The CCJ leads in circulation, advertising and prestige

hours in which deliveries can be made, retaining all regular customers and developing as much additional patronage as is possible, and wherever practicable, adding to each route without greatly increasing its mileage. This general policy is followed because of the limitations of delivery equipment, time and the size of the loads that can be carried.

Limitations With Horse Vehicles

When the Dillman bakery had sufficient business, a horse and wagon was used for delivery, and this equipment was added to as custom increased until there was a number of routes radiating from Woodhaven Junction, but the distribution being largely in Jamaica. The longest route covered was about 18 miles, this being within a radius of about 6 miles. Orders from stores further away could not well be considered because of the cost of special delivery, and the only method of development appeared to be to increase the area of distribution. This was not practical with horse vehicles, unless a station could be established to which large loads could be hauled direct, and from there delivered by light wagons.

There was, however, the opportunity for increased business, due to a demand that was established, and which promised material results. The location of a distribution point meant investment that would not immediately be productive, and the alternative was a different form of delivery equipment that would make possible extension of the routes. The company decided to try a light gasoline delivery wagon, and to make delivery in the sections from which the largest demands were received. The machine was moderate in price and was reasonably well constructed, but it was too fast and too light for the work, as well as being more or less experimental.

Experiment Justified More Machines

This vehicle demonstrated possibilities, could it be maintained in serviceable condition, and while it was not a practical success when regarded from the viewpoint of continuous service, because of frequent failures and considerable expense, due in some measure to lack of knowledge and inexperienced drivers, the company was convinced that machines would be a profitable investment. Then an order was given for three light delivery wagons, and the first purchase was used for general purposes and special order deliveries, and with this equipment, in addition to the horses, the routes were extended in several directions, covering considerably more area and taking in some of the eastern part of Brooklyn.

When these vehicles were bought, a small garage was established, and a mechanic was engaged, whose work was to keep the machines in operative condition, and later on five more of the same type of vehicles were bought, this making the total nine. The second series of wagons, however, did not give the same degree of satisfaction, because of changes in construction, and they were not as enduring or as reliable, although the experience with them would naturally be expected to produce better results. Next a number of larger capacity machines were purchased and these were used with decidedly better results, but they were of high power, and they were worked too hard by the drivers—that is, they were driven much too fast both with and without loads, and deteriorated because of this fact. These were used until April of this year, when eight Federal 3000-lb. trucks were bought, and these are now in use. The best illustration of the satisfaction obtained from these is the fact that three more were delivered, January 1st.

Body Construction Limits Loads

The Federal chasses have been equipped with a special type of body, having a substantial wooden frame with steel panels, these each having a capacity for forty cases, each containing thirty-two loaves of bread, and the total load, including the cases, is between 3100 and 3200 lbs., the weight of the filled cases ranging from 77 to 80 lbs. Determining body capacity was a matter that required careful consideration. All of the bodies constructed up to the present Federal equipment were too large, and the drivers were inclined to overload them rather than return for additional cases when the freight first taken out was insufficient, and there is no question but that this possibility of overload was one of the causes that contributed toward the rapid wear of the earlier machines.

Routes From 56 to 120 Miles

The company uses four of the Federal machines on the long routes, and these are from 56 to 120 miles, being covered every day in the year except Sundays, so that the mileage of all of these machines is much in excess of what would be considered normal service. With the purchase of trucks, the routes on which they were used were extended materially and naturally the highways that radiate from Jamaica east were followed. About 2½ years ago that along the south shore was extended to Bayshore, this serving the villages of Springfield, Valley Stream, Lynbrook, Rockville Center, Baldwin, Bellmore, Freeport, Seaford, Massapequa, Amityville, Babylon and West Islip, the round trip being 80 miles daily.

Another route was developed through the center of the island, which serves Jamaica, Queens, Floral Park, New Hyde Park, Mineola, Garden City, Hempstead, Jericho and Hicksville, and intervening points, this having a mileage of 60.

A year ago the north shore route was established, this taking in Flushing, Little Neck, Douglaston, Manhasset, Roslyn, Greenville, East Norwich, Cold Spring Harbor, Huntington, Centerport and Northport and other villages, this having a regular mileage of 120. The shortest of these long routes serves Woodhaven, Canarsie, Pergen Beach, Sheepshead Bay, Brighton Beach and Coney Island, the average mileage being 56.

Distribution in Brooklyn and the Bronx

From the bakery, distribution is made in the eastern section of Brooklyn as far west as 76th Street, and south from that boundry, and other routes are on Staten Island, which is reached by ferry from Brooklyn. The customers in the Bronx are served by horse wagons from a distributing station at 136th Street and Southern Boulevard, but the stock is carried from the plant of this station by a four-ton truck that makes two or three trips daily, carrying a freight of one hundred cases. The distance from the bakery to the station is 16 miles, this requiring either 64 or 96 miles a day for this machine, according to the business. The logical development will be additional trips for this truck or a second and larger vehicle. With the increase will be expansion of the routes and the utilization of motor delivery wagons.

There is in Brooklyn what is known as a "relief station." All of the Brooklyn wagons and machines start from the bakery with full loads, some of which will not fully supply the routes covered. To return to Richmond Hill would take too much time and would be too costly, so a supply of bread is carried to the station, which is located so as to best convenience the drivers, and this is drawn upon as required. This will lead to the location of a distribution station, and perhaps more than one, with the view of saving the time of the men for work developing the routes.

Limitations of Motor Truck Delivery

There is a limit to the length of route that can be covered by a single vehicle, because the time available for delivery, the load that can be carried and the speed are three very important factors. Distribution must be made to have the dealers supplied by a reasonably early hour in the morning, preferably before the stores are opened. While theoretically the least mileage for delivery is the most economical, to restrict business to specific areas would be to place limitations upon expansion. The loads that can be carried must govern the speed of the vehicles very largely. Maximum loads can be carried at the start, for they are constantly decreased, and as a matter of fact, the average load is delivered with a view of lightening it as rapidly as is possible. Where practicable the route delivery is made in what might be termed loops, but the long routes are straightaway, the returns being made with loads of empty cases, which are comparatively light.

The illustration showing a line of Federal machines was made in front of the loading shed, which also serves as a garage. There is a shop where overhauls are made, but adjustments and minor repairs are made in this part of the plant. The loading shed can be closed so the men are protected from storm and cold, but there is a limit to the number of vehicles that can be loaded. This necessitates loading in relays. Loading is begun early in the evening, for the long route machines are started away at 11.20, and from that hour at night the work of distribution for the following day is begun. Sufficient time must be allowed for storms and delays on the road, for the drivers are expected to reach the last customer by 7 o'clock, and as many stops must be made returning, for the drivers make daily collections and pick up the empty cases.

The governing of the speed of the machines has been found to be extremely satisfactory in that they cannot be driven fast, and this is a decided protection. The company has had plans prepared for a garage, 100x100 ft., which will be built the coming spring, and this will be fitted with every facility for maintenance and repair.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

The Trend of Commercial Car Design for 1915

By J. HOWARD PILE

IN this issue, and in the February issue, we are publishing specifications of the commercial cars which will be marketed during the coming season. This issue contains data on the cars made in the East; the next issue will contain data on the cars made in the West. The following is an analysis and general deductions from the combined data.

This analysis does not pretend to show what the best practice is in any particular case, but shows the average of all the models of a particular capacity. This information should prove of value to designers, buyers and sellers, as it gives a ready means of comparing your truck with the average truck and noting wherein it differs or excels the average truck.

In the tables printed here, it will be noticed, that as a rule the figures and per-percentages for the 600-, 800-, 1200-, 2500-, 12,000-, 15,000-, and 20,000-lb models seem to jump and do not follow the trend of the other models. This can, perhaps, be explained by the fact, there were very few of each of these sizes, and therefore one or two makes may dominate and throw out the figures.

Prices

The prices in all cases are chassis prices, as trucks are usually quoted in that way, the body price being additional. Body prices may range from $25 to $1000 higher than the chassis price, depending upon the size and the style of body.

Capacity	Average 1914 price	Average 1915 price	Increase or decrease
500	$426	$270	—$156
600	550	425	— 125
800	....	774	....
1000	961	799	— 162
1200	....	806	....
1500	1372	1450	78
2000	1729	1723	— 6
2500	1567	1727	160
3000	2117	1984	— 133
4000	2677	2417	— 260
5000	3135	2696	— 439
6000	3434	3181	— 253
7000	3525	3291	— 234
8000	3760	3526	— 234
10000	4241	4236	— 5
12000	4600	4587	— 13
15000	....	4350	....
20000	4650	4850	200

This table clearly shows that the prices of all models but three have been reduced. Figuring up the reductions, we find that prices have been reduced on an average of about $113 for each model. This is not strictly true, however, because there is a greater reduction on the larger models than on the smaller ones.

Commercial Car Capacities

For the coming season there will be placed on the market approximately five hundred different models of various makes and capacities, as against about four hundred last year. The 4000-lb models are numerically in the lead, followed in order by the 3000-lb., 2000-lb., 6000-lb., and 1500-lb. It will be noticed from the following table that last year, the 2000-lb. models were in the lead.

Capacity lbs.	1914 models	1915 models	Increase or decrease
500	6	13	7
600	1	4	3
800	8	4	—4
1000	22	15	—7
1200	5	5	0
1500	37	40	3
1600	0	1	1
2000	63	45	—18
2500	3	6	3
3000	51	72	21
4000	57	74	17
5000	9	21	12
6000	40	42	2
7000	14	16	2
8000	13	18	5
10000	36	37	1
12000	8	15	7
14000	5	0	—5
15000	0	2	2
16000	0	1	1
20000	2	3	1
Totals	380	434	54

Cylinders

A survey of the motors shows that the four-cylinder motor is by far the most popular type. The only types using two-cylinder motors are the smaller capacities. The following table gives the percentage in each model:

Capacity	% 1 cyl.	% 2 cyl.	% 3 cyl.	% 4 cyl.
500	.08	.31	..	.62
600	..	.50	..	.50
800	..	.25	..	.75
1000	..	.27	.07	.67
1200	..	.40	..	.60
1500	..	.05	..	.95
2000	..	.04	..	.96
2500	..	..	..	1.00
3000	..	.04	..	.96
4000	..	.03	..	.97
5000	..	.05	..	.95
6000	..	.02	..	.98
7000	..	..	..	1.00
8000	..	..	..	1.00
10000	..	..	..	1.00
12000	..	..	..	1.00
15000	..	..	..	1.00
20000	..	..	..	1.00

A noticeable fact shown by the above table is the very few one-cylinder models. The increase in the use of four-cylinder motors from the smaller to the larger models can be seen, and the decrease in the two-cylinder models. There were only two six-cylinder trucks listed.

Cylinder Dimensions

Cylinder bores, on the whole show a slight decrease, while on the other hand, the stroke has been slightly increased.

The average decrease in bore for each capacity is .06 in.; the average increase in stroke for each capacity being .01 in.

Capacity	1914 bore	1915 bore	Increase or decrease	1914 stroke	1915 stroke	Increase or decrease
500	3.37	3.59	.22	3.75	4.13	.38
600	3.00	2.99	—.01	4.50	3.94	—.56
800	....	3.53	..	....	4.44	..
1000	3.87	3.55	—.32	4.50	4.10	—.40
1200	....	3.95	..	....	4.85	..
1500	4.00	3.73	—.27	5.00	5.05	.05
2000	4.00	3.92	—.08	5.00	5.08	.08
2500	3.75	3.71	—.04	4.87	5.25	.38
3000	4.00	4.17	.17	5.00	5.09	.09
4000	4.25	4.12	—.13	5.25	5.26	.01
5000	4.50	4.31	—.19	5.25	5.31	.06
6000	4.50	4.35	—.15	5.50	5.45	—.05
7000	4.62	4.58	—.04	5.62	5.77	.15
8000	4.62	4.68	.06	5.87	5.71	—.16
10000	4.87	4.69	—.18	6.00	5.88	—.12
12000	4.87	5.06	.19	5.87	5.96	.09
15000	....	5.00	..	....	6.88	..
20000	5.37	5.29	—.08	5.75	6.00	.25

Horse Power

The average S. A. E. horsepower ratings show a decrease of about 1.4 h.p. per model. The following table gives the details:

Capacity	Average 1914 H.P.	Average 1915 H.P.	Increase or decrease
500	10	12	2
600	14	10	—4
800	..	17	..
1000	20	18	—2
1200	..	19	..
1500	23	23	0
2000	25	24	—1
2500	26	22	—4
3000	27	25	—2
4000	28	27	—1
5000	32	29	—3
6000	33	30	—3
7000	35	33	—2
8000	35	35	0
10000	38	35	—3
12000	38	41	3
15000	..	40	..
20000	47	46	—1

Wheelbases

The average wheelbases exhibit a curious tendency. The wheelbase seems to increase uniformly up to the 7000-lb. model and then go down again. It will be noticed that the greatest wheelbase was reached on the 10,000-lb. model in 1914. The wheelbases generally show an increase; the average increase being 5 in. per model.

Capacity	Average 1914 wheelbase	Average 1915 wheelbase	Increase or decrease
500	78 in.	95 in.	17 in.
600	88 in.	91 in.	3 in.
800	.. in.	98 in.	.. in.
1000	102 in.	99 in.	—3 in.
1200	.. in.	100 in.	.. in.
1500	116 in.	122 in.	6 in.
2000	121 in.	126 in.	5 in.
2500	122 in.	126 in.	4 in.
3000	130 in.	133 in.	3 in.
4000	135 in.	141 in.	6 in.
5000	141 in.	145 in.	4 in.
6000	145 in.	145 in.	0 in.
7000	144 in.	163 in.	19 in.
8000	141 in.	144 in.	3 in.
10000	152 in.	157 in.	5 in.
12000	149 in.	155 in.	6 in.
15000	.. in.	146 in.	.. in.
20000	122 in.	116 in.	—6 in.

Spark Plug Size

The movement toward the universal use of one size of spark plug continues steadily onward, and the size which will ultimately displace the others is the S. A. E. standard. It is now being used by a great majority of the makers, the old ½-in. pipe size coming second, and the metric thread bringing up the rear.

Size	Models used on	Per cent.
S. A. E.	333	.834
½-in. pipe	47	.118
Metric	19	.048

The CCJ has most readers because it gives most information

Cooling Systems

The cooling systems for the cylinder show, as usual a tendency toward air cooling in the smaller models, and water cooling the the larger models. The smaller water-cooled models make extensive use of the thermal system, while the larger capacities use a pump, of either centrifugal or gear type for circulating the water.

Capacity	% air	% pump	% thermal	% water*
500	.31	..	.62	.08
600	.50	..	.50	..
800	.25	..	.50	.25
1000	.27	..	.40	.20
1200	.20	..	.80	..
1500	..	.60	.38	.02
2000	..	.51	.27	.22
2500	..	1.00	..	..
3000	..	.75	.10	.15
4000	..	.80	.07	.13
5000	..	.95	.05	..
6000	..	.81	.05	.14
7000	..	.94	..	.06
8000	..	.83	..	.17
10000	..	.92	.03	.05
12000	..	.73	..	.27
15000	..	1.00	..	..
20000	..	1.00	..	..

*Not specified whether pump or thermal

Transmissions

The selective type of transmission leads the field of change gear devices. Individual clutch types seem to have gained considerable ground, especially in the larger capacity models.

Capacity	Selective	Friction	Progressive	Planetary	Individual clutch
500	6	4	..	2	1
600	2	1	..	..	..
800	3	..	..	1	..
1000	12	..	..	2	..
1200	1	1	..	1	..
1500	36	2	..	2	..
2000	41	1	..	2	1
2500	6	..	..	..	..
3000	68	..	3	..	1
4000	60	1	3	2	8
5000	17	..	1	..	3
6000	31	..	3	..	9
7000	12	..	1	..	3
8000	12	..	1	..	5
10000	28	..	2	..	6
12000	8	..	1	..	3
15000	1	..	..	..	1
20000	1	..	..	..	..
Totals	345	10	14	11	41
Per cent.	.81	.02	.03	.03	.09

Drive

A point of interest in looking over the styles of drive, is the increase in the number of worm-driven models. Almost without exception, the chain drive is still the most popular in the larger sizes, giving way to bevel gear drive in some of the smaller models.

Capacity	Chain	Bevel	Worm	Spur	Belt	Internal gear
500	2	6	..	1	2	..
600	2	1	..	..	1	..
800	2	2	..	..	..	..
1000	4	6	1	1	1	..
1200	2	..	..	..	..	1
1500	7	17	11	..	..	2
2000	24	6	14	..	..	1
2500	4	..	2	..	..	..
3000	43	4	22	..	..	4
4000	42	..	25	..	..	7
5000	16	..	4	..	..	1
6000	26	3	11	..	..	2
7000	13	..	3	..	..	..
8000	12	..	6	..	..	..
10000	29	..	6	1	..	..
12000	12	1	1	1	..	..
15000	2	..	..	..	..	..
20000	..	..	..	3	..	..
Totals	243	46	106	7	4	18
Per cent.	.57	.11	.25	.02	.01	.04

Clutches

The disc clutch seems to be the most popular on all models except on the 600-, 800-, 1200-, and 2500-lb. models, where the number of disc clutches is equaled by no clutch on the 600, cone on the 800, cone on the 1200, and cone on the 2500; and in the 1000, 8000, and 20,000, where the number is exceeded by the cone type. The type of clutch used does not show any uniform progression in the models, so we give the totals.

Clutches	No.	Per cent.
Disc	218	.53
Cone	181	.44
Band	6	.01
No clutch*	6	.01

*In connection with friction transmission.

Speeds Forward

The most generally used type of transmission is that having three speeds forward. The larger sizes provide a fourth speed, and many of the smaller models have simply the two speeds. All models are provided with one speed on reverse.

Capacity	2 speeds	3 speeds	4 speeds
500	5	4	1
600	..	2	..
800	1	3	..
1000	5	10	..
1200	1	1	..
1500	2	34	2
2000	2	39	2
2500	..	6	..
3000	..	66	4
4000	..	68	2
5000	..	19	2
6000	..	36	6
7000	..	13	3
8000	..	16	2
10000	..	27	10
12000	..	9	5
15000	..	2	..
20000	..	..	1
Totals	16	355	40
Per cent.	.04	.86	.10

Steering and Control Levers

Left-side steering with center control seems to be gaining ground as rapidly in the commercial car field as in the pleasure car field. It is a rather curious fact, however, that the large trucks are adhering to the old right-side drive more than the smaller sizes. Center control is the most popular, even with the right-side drive.

Capacity	Drive Right	Drive Left	Control Right	Control Left	Control Center
500	3	6	5	3	4
600	2	2	1	..	3
800	2	2	1	..	3
1000	3	12	3	..	11
1200	2	2	2	..	1
1500	6	31	3	1	36
2000	12	33	5	1	39
2500	..	6	..	..	6
3000	24	47	10	4	56
4000	22	47	16	4	52
5000	4	16	2	1	17
6000	20	16	17	3	21
7000	5	11	2	..	14
8000	10	4	13	1	3
10000	22	11	21	1	12
12000	8	6	6	3	4
15000	1	1	1	..	1
20000	2	1	..	..	3
Totals	148	254	109	22	287
Per cent.	.37	.63	.26	.05	.69

Engine Starters

There has not been the increase in the use of engine starters on commercial cars which was expected. It is rather surprising, in view of the almost universal use of the engine starter on pleasure cars, to find the very small number of commercial cars equipped with them. There are a number of makers who regularly equip their trucks with starters for a fixed extra cost, but this is not included in the catalog or list price. All the starters which are part of the regular equipment, are of the electric type.

	No.	Per cent.
Engine starters (regular equipment)	33	.09
Engine starters (Extra Equipment)	36	.10
No engine starter	353	.81

Weight Carried on Rear Wheels

The smaller vehicles, as a rule, carry a smaller proportion of the entire load (including chassis, body and load), on the rear wheels than do the larger ones, although the percentage drops with the three largest models.

Capacity	Per cent. carried on rear wheels
500	61
600	65
800	63
1000	68
1200	52
1500	66
2000	71
2500	71
3000	71
4000	72
5000	74
6000	71
7000	72
8000	69
10000	74
12000	66
15000	63
20000	88

Tires

As a rule, commercial cars of 1500 lbs. capacity and under, are equipped with pneumatic tires, while those above that capacity are provided with solid tires. In many cases between 1000 and 3000 lbs., the purchaser may have the option of solid or pneumatic, an extra charge being made for pneumatics.

Capacity	Pneumatic	Solid
500	10	2
600	4	..
800	3	..
1000	5	6
1200	2	..
1500	23	15
2000	1	41
2500	..	6
3000	6	59
4000	2	62
5000	..	21
6000	1	36
7000	..	16
8000	..	16
10000	..	37
12000	..	15
15000	..	2
20000	..	3
Totals	58	337

Rear Axles

Naturally, dead rear axles predominate on account of the large number of chain drives. The smaller models, having other types of drive, are provided with suitable axles to perform the duty assigned to them.

Capacity	Dead	Floating	Semi-floating	% floating
500	4	6	2	..
600	3	..	1	..
800	1	2	1	..
1000	6	2	5	2
1200	3	..	1	..
1500	8	18	7	5
2000	25	17	1	..
2500	4	..	2	..
3000	45	16	7	..
4000	51	17	4	..
5000	17	2	1	..
6000	28	11	3	..
7000	14	2	..	..
8000	11	7	..	..
10000	30	6	1	..
12000	13	2	..	..
15000	2	..	..	..
20000	3	..	..	..
Totals	268	108	36	7
Per cent.	.64	.26	.08	.02

The CCJ has most advertisers because it gives them biggest returns

Preferred Practices: From the foregoing remarks and tabulations, the reader can get a good idea of the prevailing practice on the various models. In order to give a better prospective of the average commercial car design, we give the following table which gives numerical averages and pluralities.

Capacity	Chassis Price	Wheelbase	H. P.	Cyls.	Bore	Stroke	Cooling	Clutch	Drive	Transmission	Speeds	Rear Axle	Tires	Steering	Control Levers	Per cent. on Rear Wheels
500	$270	95	12	4	3.69	4.13	T	D	B	S	3	F	P	L	R	61
600	425	91	10	2, 4	2.99	3.94	A, T	D, N	C	S	3	D	P	R, L	C	65
800	774	98	17	4	3.53	4.44	T	D, C	C, B	S	3	F	P	R, L	C	63
1000	799	99	18	4	3.55	4.10	T	C	B	S	3	D	P	L	R	68
1200	806	100	19	4	3.95	4.85	T	D, C	C	S	2, 3,	F	P	R, L	C	52
1500	1450	122	23	4	3.73	5.05	P	D	B	S	3	D	P	L	C	66
2000	1723	126	24	4	3.92	5.08	P	D	C	S	3	D	S	L	C	71
2500	1727	126	32	4	3.71	5.25	P	D, C	C	S	3	D	S	L	C	71
3000	1984	133	25	4	4.17	5.09	P	D	C	S	3	D	S	L	C	71
4000	2417	141	27	4	4.12	5.26	P	D	C	S	3	D	S	L	C	72
5000	2696	145	29	4	4.31	5.31	P	D	C	S	3	D	S	L	C	74
6000	3181	145	30	4	4.35	5.45	P	D	C	S	3	D	S	R	C	71
7000	3291	163	33	4	4.58	5.77	P	D	C	S	3	D	S	L	R	73
8000	3526	144	35	4	4.68	5.71	P	C	C	S	3	D	S	R	R	69
10000	4236	157	35	4	4.69	5.88	P	D	C	S	3	D	S	R	R	74
12000	4587	155	41	4	5.06	5.96	P	D	C	S	3	D	S	R	R	66
15000	4350	146	40	4	5.00	6.88	P	D	C	S, IC	3	D	S	R, L	R, C	63
20000	4850	116	46	4	5.29	6.00	P	C	SP	E	4	D	S	R	C	88

ABBREVIATIONS USED IN THE TABLE

Cooling: A, air; T, thermal; P, pump.
Clutch: D, disc; N, no clutch; C, cone.
Drive: B, bevel; C, chain; SP, spur.
Transmission: S, selective; F, friction; IC, individual clutch; E, electric.
Rear axle: F, floating; D, dead.
Tires: P, pneumatic; S, solid.
Steering: R, right; L, left.
Control levers: R, right; L, left; C, center.

Truck Situation in Kansas City—Poor Pavements and Hill Obstacles

By J. E. FOLAND

KANSAS CITY, presents a hard problem for motor trucks. The city itself is divided into two distinct "bottoms," both east and west, and the upper part of the city.

Until recently, all the city's shipping, freight and jobbing business was conducted, largely in the west bottoms. These bottoms, naturally, have been invaded by the railroads and nearly all of the large forwarding stations are located there. The streets in this section, are, practically all paved with the old-fashioned cobble stone and sand stone blocks. The foundations of these pavements, are inadequate for the heavy traffic that they have been forced to carry and repairs are always badly needed before they can be made. The result of this is, rough, very irregular streets, cut and crossed by frequent railroad rails, dotted with holes, large enough almost to bury a good-sized wagon wheel. With these conditions prevailing, the west bottoms of the city have presented a task, next to impossible to the motor truck.

The up-streets are largely of a different character, although little better. The facts are, that a large amount of asphalt which predominates on the up-streets was laid by a paving company now out of existence.

There are many steep grades and the streets paved as they are with the roughest of paving, so that the poor horse can secure a foothold, are for that reason very hard on trucks. The truth is that only in equable weather, does the horse try the worst hills, because of the killing heat in the summer months and the slippery dangers of the winter months. Trucks, however, make them all the time, and, the roughness, as bad as it is, is only another obstacle, that must be, and is daily overcome.

The Kansas City park department can boast, however, of the beautiful parkways and boulevards. Miles upon miles of the smoothest of oiled roads, wind in and out, throughout the entire city, trucks are allowed only a block on such streets to make deliveries.

The first of July, 1914, the closest estimates showed 450 trucks in use in Kansas City and vicinity between the capacities of 1000 lbs. and 5 tons. No less than fifty different manufacturers are represented in this number, together with the many nondescripts that are bought in pieces from the salvage companies and united in a truck by some local mechanic.

If the truth be told Kansas City has grown out of its boots. Where 50 years ago, there were but a few frame buildings to-day stands a city that has no less than 450,000 people within a radius of 15 or 20 miles. It is small wonder that the foundations of its pavements are not laid heavy enough for the present-day truck traffic. This city has experienced greater difficulties than any other city of the Middle West through bluffs, clay and gumbo.

The Municipal Fleet

The municipal commercial car equipment of Kansas City is composed of sixty-nine self-propelled vehicles, thirty-five of which are Ford runabouts. These are used in practically every department of the city and includes fire apparatus, oil sprinklers, police patrols, ambulances and supply wagons. The Ford cars are all used by city officials and employes.

A close record of gasoline and oil consumption, tire and repair cost is kept, and

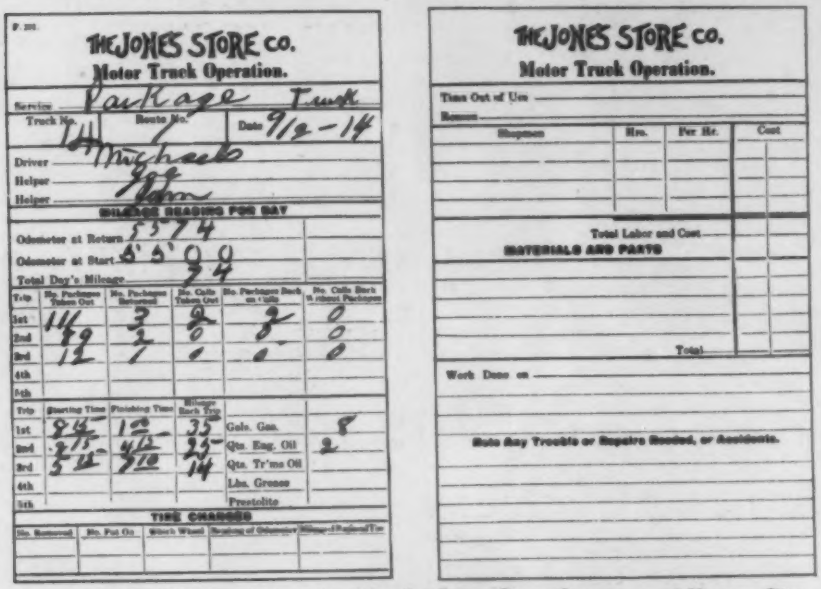
Reo Carrying Mail in Kansas City

Taking the mail from the Union Station to the downtown post office. This work is done under contract since December 1st, 1914. Trucks are fifteen minutes quicker than the old method—electric street cars.

The CCJ leads in circulation, advertising and prestige

according to those in charge of the equipment the cars have shown themselves to be more efficient as well as less expensive than the horse-drawn vehicles that were operated by the city heretofore.

Not so long ago, one of the taxicab officials of this city made the statement that it cost for the operation and maintenance of its machines in Kansas City 80 per cent. higher than in Chicago. This was attributed to the bad condition of the streets.



THE JONES STORE CO.
Motor Truck Operation.

Service: Package Truck
Truck No. 11 Route No. Date 9/2-14
Driver: Mychaels
Helper: John
Helper:

MILEAGE READING FOR DAY

Odometer at Return 5374
Odometer at Start 5340
Total Day's Mileage 34

Trip	No. Packages Taken Out	No. Packages Returned	No. Coils Taken Out	No. Packages Back on Coils	No. Coils Sh'n without Packages
1st	14	3	2	2	0
2nd	9	2	0	0	0
3rd	12	1	1	1	0
4th					
5th					

Trip	Starting Time	Finishing Time	Mileage Back Trip		
1st	9 45	12	35	Gals. Gas.	8
2nd	2 15	4 12	33	Qts. Eng. Oil	2
3rd	5 12	5 10	14	Qts. Tr'ns Oil	
4th				Lbs. Grease	
5th				Prestolite	

TIRE CHANGES

No. Removed	No. Put On	Which Wheel	Reading of Odometer	Mileage Replaced Tire

THE JONES STORE CO.
Motor Truck Operation.

Time Out of Use
Reason

Shopmen	Hrs.	Per Hr.	Cost

Total Labor and Cost
MATERIALS AND PARTS
Total

Work Done on

Note Any Trouble or Repairs Needed, or Accidents.

Front and Back Views of Card Used by the Jones Store Company, of Kansas City, to Keep the Cost of Their Truck Maintenance

Trucks of Kansas City Star

Another of the large users of commercial cars in Kansas City is the *Kansas City Star*, which newspaper operates a fleet of twelve G M C electrics in addition to two five-ton Saurers, two two-ton Macks, one 1500-lb. Commerce and seven Fords equipped with delivery bodies. Last season Kansas City was practically tied up by heavy snows which threatened the commercial activity of the city and caused many of the firms who are using horse-drawn vehicles to cease deliveries. The *Star* was delivered at the door of every subscriber by the use of their trucks.

According to those in charge of these trucks it would be impossible for horses to do the work that is now accomplished. One of the electrics makes a trip of 18¼ miles from Kansas City to Independence in 1 hour. Seven stops are made. The subscribers in the latter city get their papers 1 hour after press time.

A record sheet is kept in the paper office that shows the mileage, gasoline and oil consumption of the gas cars and mileage and the consumption of electricity by the electrics. The trucks are used for both the morning and evening editions and are for that reason in almost constant use. A repair shop is maintained by the publishers and the cars are kept in the best of condition at all times. At least 35 per cent. is saved by this shop.

Jones Store Company, one of the largest department stores in this city, has in its service a fleet of seven White trucks. Five of these are used for house to house deliveries while the remaining two take care of the suburban deliveries. These trucks are in almost constant use and have been a profitable investment for their owners.

According to J. B. Swinney, general superintendent of the store he makes his deliveries 35 per cent. cheaper than he could do it with horses. Suburban deliveries are made to towns at a distance of from 10 to 20 miles and in this way the company gets business that it could not get if it depended on the horse-drawn vehicles for deliveries.

This firm has worked out an excellent system for keeping records of the expense of its trucks. A small card about 4x6 in. is carried by the driver of each truck. One side has a space for the name of the driver and his helpers, one each for the odometer reading at start and finish of the day's run, another for the total mileage for the day, other spaces are provided for all deliveries, starting and returning time and gasoline and oil consumption and a special space for tire changes. This record is kept on file and at the end of the month, the man in charge knows just how much it cost him to make deliveries and how many miles he got from each tire.

On the reverse side of the card are spaces for the time that the truck is in the repair shop and for material and labor costs and who did the work. This side of the card is used in the company's own repair shop, which, according to those in charge shows a saving of nearly 50 per cent.

Flower stores, furniture houses, cleaners and dyers, department stores, retail and wholesale grocers, breweries, farmers, dairies, stock farms and in fact every line of business is at the present time represented by trucks and commercial cars in Kansas City, which proves beyond a doubt that the problems presented to this latest mode of transportation by the hills of Kansas City have been solved by the motor truck.

MAIL DELIVERY IN DETROIT

Detroit, Mich., enjoys the distinction of having been the first city in the United States with a completely motorized system of mail delivery and collection. Coincident with this it has established a record in the matter of economical operation that is causing the post office department to take notice. Most of this change was wrought during the régime of Postmaster William J. Nagel, the present incumbent.

When Postmaster Nagel took office a half dozen motor trucks were used, by contract, in transporting mail to and from railroad stations and to substations. Gradually their number was increased, but it was not until the coming of the parcel post that a thorough revolution was wrought. At the beginning, parcel post deliveries were made with machines furnished under contract. For these, the charge was $8.33 per day each, this including the services of a driver, although a carrier was necessary to comply with the post office regulations. After a time the contract price was reduced to $7 per day. Then the postmaster dealt direct with owners of machines, and a $6 rate was secured.

Even this saving was not sufficient to satisfy Mr. Nagel, who foresaw greater possibilities. With Superintendent of Deliveries Kellogg, he evolved the plan of having carriers, to serve as parcel post distributors, buy their own machines, the government allowing them $75 a month for operation and maintenance. There are at present sixteen of these machines in service. Each accomplishes as much as was done under the old system, and it costs the post office department $75 per month for the service, as against $216.50 for the same period under the old plan, a saving in this one-quarter of $2264 per month.

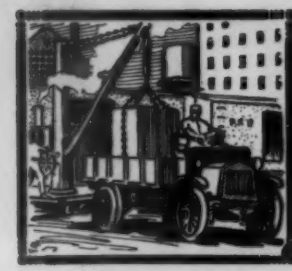
Some months ago an analysis of parcel post delivery expenses was made, and it was discovered that it cost $.06 to get each package to its destination. By rerouting cars and rearranging the zones in which they operate, it has been possible to reduce the cost to $.039 per parcel, with the expectation that it will eventually come down to $.03. The men care for their own cars, and the government is absolved of all responsibility save the allowance for maintenance, as noted above.

One year ago the collection service consisted of twenty horse-drawn vehicles, three bicycles and one foot collector. It was pitifully inadequate. Now twenty cars are utilized, and more than triple the number of collections are made, at no greater expense than was entailed under the former system.

The collection and parcel post equipment consists chiefly of Wagenhals tri-wheelers and Ford cars. The government owns the Wagenhals machines, which are working out very satisfactory, while the Fords are practically all the property of carriers who have been detached from their accustomed duties and assigned to parcel post delivery.

In all, forty-four machines are used by the Detroit post office, ranging from heavy trucks, which carry the mails on contract to the stations, down to the light delivery cars.

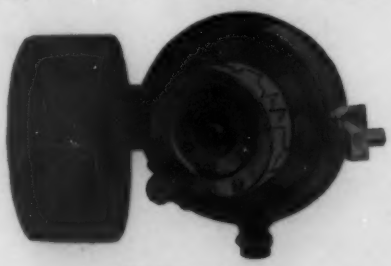
The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?



TRUCK ACCESSORIES AND APPLIANCES

THE RECORDOGRAF

The Recordograf is an instrument designed to record the daily movements of a commercial car, so that an absolute check may be had over the vehicle at all times.



The Recordograf
Produces a paper record giving time, distance, speed and stops

The instrument gives forth a paper tape, on which is shown the time, distance, speed and stops of the vehicle to which it is attached. It is attached with a very effective collar and star type of transmission, to the front wheel, and all of the parts are slow moving, a flexible shaft rotating at only 60 revolutions to the mile. Through a special means of attachment the apparatus is made positively tamper-proof.

The use of this instrument permits of great efficiency being derived of the vehicle to which it is attached, at all times. It serves as a protection alike to the operator and the truck owner.

The list price of the instrument complete, with one year's supply of tapes, is $60. It is manufactured by the American Taximeter Company, 735 Seventh Avenue, New York City.

ELECTRIC VAPORIZER FOR COLD-WEATHER STARTING

The Ideal Brass Works, of Indianapolis, Ind., is placing on the market a new electric primer for cold weather priming. The gasoline is electrically heated by four ordinary dry cells, and is discharged into the intake manifold just above the carburetor. The gasoline is supplied from a small gravity primer that can be mounted on the dashboard. The company also puts out a model with a pressure primer that draws the gasoline from the main supply line and forces it into the vaporizer.

This little vaporizer is very small and is inserted into the intake manifold, therefore the heating is all concentrated on the inside. The intake manifold is drilled and tapped out for ¼ in. standard iron pipe size, just above the carburetor to admit the vaporizer.

Four ordinary dry cells will heat up a sufficient amount of vapor to start any motor in the coldest of weather, in the time it takes the operator to go around to crank the car after he has turned on the switch. The device can be operated on either six or nine volts dry cells or ordinary storage batteries. It retails for $5 complete, ready for installation, less batteries.

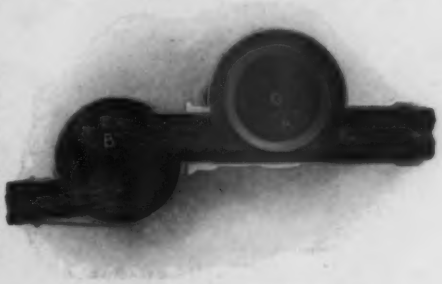
THE KELLOGG TURBINE MUFFLER

The Kellogg Manufacturing Company, Main and Circle Streets, Rochester, N. Y., has evolved a new muffling device which is claimed to silence the noise of the exhaust more effectively and with less back pressure than the types now in use. It is said that this new device not only reduces back pressure, but actually creates a vacuum to pull the exhaust gases out.

New Ideal Electric Vaporizer
Without batteries, $5

The Superior Garage Heater—$25

A simple turbine wheel (marked by letter A in the illustration) is mounted in the path of the exhaust. Just forward of this turbine wheel is an opening or by-pass which leads to the center of the turbine. The rapid turning of the turbine (A) caused by the exhaust of the motor creates a powerful suction that relieves the motor



Cut-Away Section of Kellogg Turbine Muffler

of all back pressure as well as the heat and carbon producing elements. A simple baffle plate of uncomplicated design (see B in illustration) further muffles the reports.

THE SUPERIOR GARAGE HEATER

Owners of one or two motor trucks who do their own garaging will find that it pays to have their garages heated during the extremely cold winter nights, as it will eliminate drawing off the cooling water at night and make it much easier to get away in the morning. For this purpose the Superior Manufacturing Company, North Side, Pittsburgh, Pa., has designed the heater illustrated herewith.

The heater is a small furnace, consisting of a combustion chamber and tubular radiator inside a heavy galvanized casing, the outside dimensions of same being: length, 40 in., height 33 in., width 12 in.

It is as easy to install as a common gas stove. The combustion chamber contains one of the Superior single piece cast iron burners, a basket of patent English artificial fuel and a small pilot light.

All the air consumed in the furnace is conveyed into the combustion chamber through an intake pipe from a safe place above or outside the building, thus insuring absolute safety from contact with explosive and inflammable gases generally found in garages. No gases or air from the inside of the building can possibly enter the heater at any time. The heater is provided with a safety locking gas-proof door, which need be opened but once during the cold season to light the pilot, which uses so little gas as to not deserve consideration. To obtain the heat desired it is only necessary to give the valve handle a turn.

With two elbows, two lengths of pipe, two rain caps and a damper, the price is $25.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

MALLEABLE ALUMINUM

Under this name the Pioneer Brass Works, Indianapolis, Ind., is turning out aluminum castings, which are claimed to be 10 to 50 per cent. stronger and 3 per cent. heavier than the No. 12 alloy. Although not too easily bent for practical use, these castings can stand much bending strain before cracking. There is a noticeable absence of pin holes in the metal and drag on tools. Riveting can be done. Prices are about the same as those of regular aluminum.

A NEW MACHINE FOR GRINDING WORMS

The Cleveland Worm and Gear Company, Cleveland, Ohio, has designed a new machine for grinding worms, an illustration of which we show herewith.

This machine automatically grinds worm teeth of any lead or number of starts. The worms all have straight sides, therefore it is feasible to grind with a straight face wheel instead of a wheel shaped so as to conform to the curvature of the tooth.

The only provision which is made, is for the wear of the grinding wheel, which is accurately taken care of by means of a special adjustment at the end of each cut.

The indexing from one tooth to the next, is direct, being made by gearing, and not by means of a dividing plate. The lead is also generated by means of gearing, and not by a master pilot of the same lead as that of the worm.

Special provisions have been made, so that worms may be ground of any helix angle which may be desired.

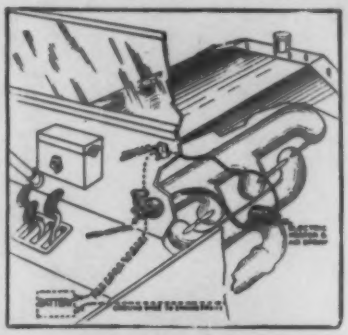
Recent tests have shown that the error in grinding 72 in. of traverse, including twelve divisions, and 6 in. of traverse to each division, was .002 in. This would mean that the error per tooth of the worm was approximately .00017 in.

New Cleveland Worm Grinder

IECO ELECTRIC MANIFOLD PLUG

This plug combines three distinct devices into one, a primer, an electric vaporizer or sprayer and a gasoline saver. From the priming cup on the dashboard a length of copper tube leads to the Ieco Plug, which is inserted in the intake manifold of the engine, above the carburetor. The plug is connected to either the storage battery or dry cells.

The gasoline from the priming cup passes through the Ieco Plug, and it is not only sprayed but vaporized into the manifold, with the result that, as the engine is cranked over a charge of hot vaporized gasoline enters the cylinders. The engine starts, it is claimed, on the first turn over,



Installation of Ieco Electric Manifold Plug, $5

just as easily on a cold morning as on a summer day.

Other uses are as an auxiliary air valve, increasing power of engine, saving in gasoline and cleaning cylinders and valves of carbon deposit. It is easily attached, and has no moving parts to wear or get out of adjustment. The price complete, ready to install, is $5. It is marketed by the Interstate Electric Company, Baronne and Perdido Streets, New Orleans, La.

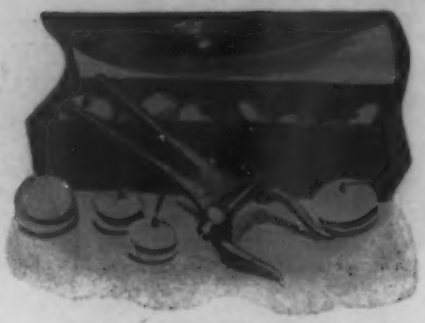
SAMPSON REPAIR PLUG FOR INNER TUBES

A very practical and, at the same time, quick inner tube repair device has just been announced by Stevens & Company, of New York City, and which should prove of special interest to the user of light-delivery cars or trucks shod with pneumatic tires.

The feature of the plug lies in the fact that it makes a permanent, quick repair without the use of cement or gasoline; in fact, without even cleaning the tube and without waiting for anything to set or dry.

The same screw principle is used as that utilized to fasten a valve stem in the inner tube, the two halves of the plug providing a soft rubber surface over a metallic disk, the rubber being soft enough to mushroom at the edge of the upper part of the plug which comes in contact with the casing, the plug being flattened out by the pressure to a negligible thickness.

A tool is supplied with the kit to cut a clean hole around the puncture and then to distend this hole in the tube for the insertion of the plug. When the plug is



Sampson Repair Plug Outfit

screwed up tight with the bare hands, the wire screw handle is readily broken off below the surface of the rubber.

NEW RUTENBER MOTOR FOR SMALL TRUCKS

The Rutenber Motor Company, Marion, Ind., announces a new four-cylinder motor, model 20, 3½-in. bore, 5-in. stroke, especially adapted to small trucks and delivery wagons of 1500-lb. to one-ton load. The design embodies important new features favorable to the car manufacturer, by giving an option as to pump or thermo-syphon cooling, one or two unit starting and lighting systems, and almost any known make of either type of electrical apparatus.

The cylinder and upper part of the crank case are cast en bloc. The cylinder head is detachable and held down by eighteen ¼-in. studs, making an absolutely tight joint. The water jacket is designed for efficient cooling, particularly in the neighborhood of the valve seats. Care has been taken to eliminate any steam pockets. The water jackets in cylinder and head are connected by no less than seventeen holes, to insure uniform temperature.

The intake valves have a clear diameter of 1¾ in., and the exhaust valves 1½. The carburetor is carried on the side opposite the valves, and connects by a passage cored through the jackets to an external branch pipe which distributes to the cylinders. The carburetor flange is 1¼-in. S. A. E. standard. The valve guides are removable. The lifters are assembled in sets of four in a detachable bracket, which bolts to the side of the crank case.

The bearing pressures throughout the motor have been kept low, with a view to exceptionable reliability in truck service. The cam shaft and auxiliary shaft are driven by 8 P. helical gears, which operate in a bath of oil. The pistons are very light and are finished inside.

The lubrication system is designed for high duty service. A vane pump, located on the gear cover, having a capacity of two gallons a minute at 1000 r.p.m. of the engine, takes oil from the base through an easily detachable filter and delivers it through an external pipe to the cam shaft and crank shaft bearings, and thence to the big ends by leads drilled in the shaft. The cylinders and piston pins are lubricated by the oil thrown off from the connecting rods. The fan is a two-blade aluminum aeroplane type, running on ball bearings and with eccentric adjustment.

The CCJ has most readers because it gives most information

Motor Truck Design and Construction Made Plain

Advantages and Disadvantages of Different Types Discussed

By C. T. SCHAEFER, Member Society Automobile Engineers

This is the fourteenth installment of a series of articles by this well-known writer, covering in a non-technical way the various constructions now current practice in commercial car design. These articles take up, in order, the general types of chassis, the advantages and disadvantages of each, illustrated by simple diagrams, and in logical order, motor construction, ignition, carburetion, cooling, lubrication, etc., until each part of the truck has been dealt with.

PART XIV

THE UNIVERSAL JOINT AND DIFFERENTIAL

THERE is a difficulty in transmitting the power of the motor to the transmission when this is combined with the jack shaft, or from the transmission to a live rear axle, which has to be met by a special piece of mechanism. In the chain-driven vehicle, the motor and transmission usually remain in alignment when the vehicle is standing still, however road vibrations and the nature and location of the load usually cause frame deflexions which tend to destroy the alignment, while in the live rear axle the motor is protected from bouncing up and down by the chassis springs, and the road wheels are continually bouncing over the rough surface of the road. This means that at one moment the axle is in line with the motor and the next moment it may be several inches below or above the motor center.

A rigid shaft for the chain-driven vehicle would bind, unless the alignment was perfect and provision made to prevent frame deflexion, while with a live rear axle, the shaft would bend and bind in its bearings and the whole transmission system would be put out of commission in a short time. To overcome this, the shaft, which is termed the drive or propeller shaft, is made flexible to a certain extent by means of universal joints, sometimes called Hooke or Cardan joints.

Universal joints serve the purpose of connecting shafts whose axes lie in the same plane, but make an angle with each other, and are particularly required when the angle varies between the shafts in service.

There are various types and perhaps the simplest universal joint consists of a squared block secured to one of the shafts to be connected, fitting in a square hole in a sleeve secured to the other shaft. The four faces of the block are curved in the direction of the axis of the shaft to which the block is fastened. This type of joint is shown in Fig. 1.

Fig. 2 depicts a somewhat different type. This consists of six internal and external teeth; the external teeth are curved in the direction of the axis of the shaft and mesh with teeth cut into the housing. This joint is also provided with pressed steel cover and washers to retain the lubricant. The above types may be more properly termed alignment joints, since they are only used between clutch and transmissions, where only slight angular movements exist, Fig. 2 being the type of joint furnished with all sizes of the well-known Helleshaw universal clutch. These joints also constitute slip joints, since they permit endwise movement for clutch disengagement.

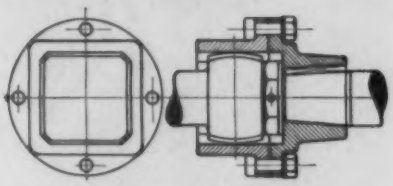


Fig. 1. One of the Simplest Universal Joints

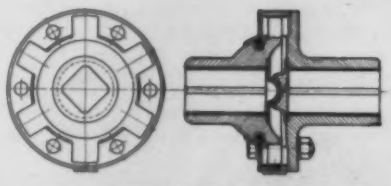


Fig. 2. Universal With Internal and External Teeth

This type is principally used between the clutch and gear box

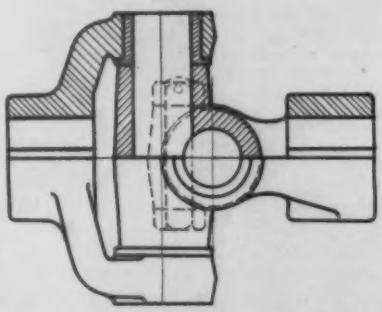


Fig. 3. Cross Type Universal With Forks

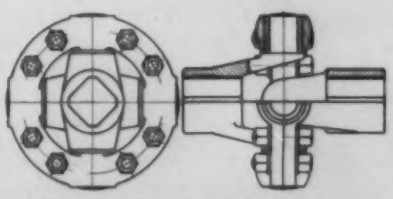


Fig. 4. Split-Ring Type Universal

The cross type of universal joint is shown in Fig. 3 and consists of two forks, each of which is secured to one of the shafts to be connected to each of the forks by a pin. In this type of joint, the axes of the two pins do not intersect, but are at some distance from each other. However there is an advantage in having the pins both in the same plane. This end can be attained in various ways by either using pins of different diameters and passing one through the other, by one long and two short pins, by forging the pins integral with a common center or forming them integral with the forks.

In the design shown in Fig. 4, the cross is replaced by a split ring, which carries the pin bearings, while the pins are forged integral with the forks. The ring is divided to facilitate assembling and thus permit the pins to have their axes in the same plane. This type of joint could also be made by forming the pins integral with a central ring and providing the forks with separate bearing caps.

Perhaps the three most popular types of universal joints in use at the present are the Spicer, Fig. 5; the Hartford, Fig. 6, and the Blood, Fig. 7. The Spicer joint is somewhat related to the type mentioned above. It comprises a central ring with the pins forged integral, having their axes in the same plane. One forked end is forged integral with a hub which bolts to the hub of the permanent shaft end, while the other fork may have either a short hub for permanent attachment to the shaft or a long hub to provide a slip joint, the slip end being shown. The bearing ends of the fork have an opening large enough to permit inserting the pins, while they are also bored

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out large enough to take bushings, which hold the ring and its pins in position. These bushings and fork ends have a circular groove cut into them, so that a soft wire can be inserted to hold the bushings in position. The entire joint is enclosed in a dust-proof pressed steel housing, which also acts as a grease retainer.

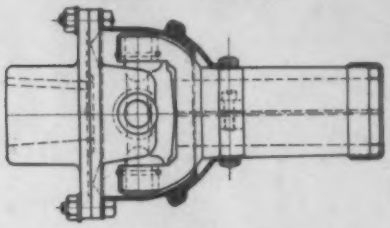

Fig. 5. Spicer Type Universal

The Hartford universal joint is of the slotted shell and trunnion type. This consists of a cup-shaped steel forging secured to one of the shafts, with two diametrically opposite longitudinal slots milled into its shell. The other shaft is provided with a ball-shaped end, fitting the interior of the shell and provided with a pin extending into the slots. Hardened steel trunnion blocks are interposed between the pins and the walls of the slots to distribute the bearing pressure. This type of joint serves as a slip joint and is easily enclosed with a leather boot and a tubular steel housing.

The Blood joint is of the pin type, having two forked ends secured to the shafts and a central block which holds the inner ends of the pins. The outer ends are enclosed by caps, which retain the lubricant.

These universals are suitable for use between the clutch shaft and transmission or between the transmission and jack shaft when the transmission is in a unit with the motor for chain drive, and between clutch and transmission or the latter and the rear axle in the shaft drive. In commercial cars, two universals are generally used for either type of drive. One universal generally has two permanent shaft attachments, while the other has one permanent and one slip joint. In the chain drive, this slip joint is usually used to compensate for variations in the shaft length and is also an advantage in assembling the chassis; while in the shaft-driven vehicle, this joint is absolutely necessary, since some provision must be made to compensate for variations in distance between the transmission and the rear axle housing, due to the play of the springs. The slip joint may either be a square or fluted shaft with a corresponding hub or sleeve.

Drive shafts are generally made of solid section. However, with the sudden increase in shaft drive construction, especially where the transmission is in a unit with the motor, comes a decided tendency to use either two solid shafts and three universals or a tubular shaft and two universals. The tubular shaft is used to reduce the weight and consequently the whipping effect and pressure on the universals.

When two shafts are used, a universal joint is generally attached to the transmission while the other end of its shaft is generally mounted in an anti-friction bearing suspended from a cross member of the frame. See Fig. 11. From this point the drive is through two universals and a solid shaft.

Differentials

Another unit of the power transmission system which must be used is the differential. It is a well-known fact that in turning a curve the outer wheels travel faster than the inner ones. To compensate for this a differential is used, sometimes called a compensating or equalizing gear.

If the rear wheels were solidly connected to each other by the rear axle and that axle driven by a chain or shaft from the center or thereabouts, great stress would be placed upon the transmission, tires and other parts, owing to the fact that both wheels in turning a corner would travel at the same speed, but owing to the fact that the outside one must travel faster than the inner one, the latter would be forced around or skidded on the road.

The layman often experiences difficulty in understanding the differential, as it is always enclosed in a casing and is entirely

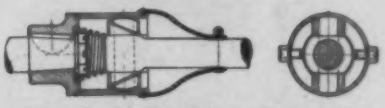

Fig. 6. Hartford Type Universal

out of sight and unless he has a chance to see it in the repair shop or factory, he has little chance to familiarize himself with its action by actual observation.

The power of the motor is applied either to a centrally divided rear axle (usually

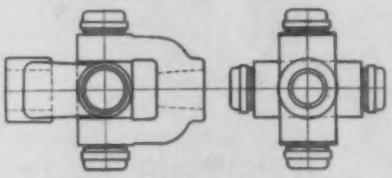

Fig. 7. Blood Type Universal

termed a live axle) or to a jack shaft, thence by chains and sprockets to the two rear wheels, turning loose on a dead rear axle. The first condition applies to all shaft-driven vehicles such as the double reduction, internal gear, bevel gear and worm drive, while the second applies to chain-driven vehicles. The action of the differential is identical for either of the above-mentioned drives. It is mounted in the rear axle housing for all shaft drives, while for chain drives it is mounted in the jack-shaft housing.

The object of the differential is to permit of equally dividing the driving effort of a single source of motive power between two driving wheels and to allow cars driven through wheels on opposite sides, to be freely steered. In turning a corner, the driving effort must be divided in such a way that one wheel may rotate faster than the other and still receive the same driving force as the other. In other words, the driving force must be equally divided between the two driving wheels under all conditions for both forward and backward motion.

The division of the driving effort is very desirable, except when the two driving wheels are on ground with greatly different co-efficients of adhesion. For instance, if one wheel got into a mud hole, it might not have sufficient adhesion to prevent it from spinning under the turning effort impressed by the differential gear and it would then be impossible to propel the car except by locking the differential, because the turning effort of the wheel standing on solid ground would be no greater than the turning effort corresponding to the co-efficient of adhesion of the wheel in the mud hole. For this reason, differential locks are often provided.

This lock may be left engaged as long as all four wheels move in a perfectly straight path. When, however, a car is to be moved in a curved path as in turning a corner, the driving wheels must revolve at different speeds, since the outside one has to cover a longer distance in the same time than does the wheel which is on the inside of the curve.

There are two types of differentials in common use, viz; the bevel type and the spur type. There are other types, but their use on commercial vehicles is not broad enough to warrant discussion at present, since they are all more or less in the experimental stage.

The bevel pinion type of differential, which is probably the most common form is illustrated in Fig. 8. It consists of the following parts: a housing A, which is usually made in halves; two bevel gears B and C secured to the differential or drive shafts D and E respectively; a two, three, or four-armed spider F, on the radial arms of which are carried bevel pinions G, G_1, G_2, G_3, meshing with both

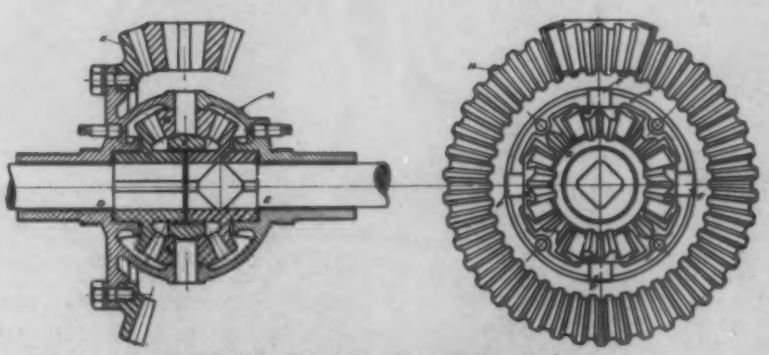

Fig. 8. Bevel-Gear Type Differential

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of the bevel gears B and C. To the housing A, of the differential, is usually bolted a bevel gear H for driving it, but this gear forms no part of the differential proper. It will be understood that the differential shafts D and E, either have secured at their outer ends road wheels or sprockets, which drive the road wheels through chains. Gear H meshes with the bevel driving pinion.

The action of this differential may be explained as follows: The spider F is held to the housing A and the turning effort or torque which is applied to the housing by means of the driving or ring gear H, and its pinion is equally divided by the bevel pinions G between the bevel gears B and C. As long, therefore, as the resistance to motion of the two bevel gears B and C, (in other words to the motion of the two driving road wheels of the car) is the same, the two wheels will turn at the same speed. If, however, the steering wheel is turned so as to move the car to one side or the other, the driving wheel on the side to which the car turns is automatically held back with a force equal to the road adherence. The differential bevel gear, B or C as the case may be, on that side will then turn slower and its mate on the other side will turn correspondingly faster, while the bevel pinions G between them will turn on their studs at a speed correspondingly to the difference in speed of rotation of the two bevel gears B and C. While a car is turning a curve, although the speeds of the two driving wheels are unequal, the tangential forces acting at their circumference are equal.

The other form of differential in extensive use is known as the spur type, illustrated in Fig. 9. The action of this can be best explained by comparison with the bevel type. The bevel gears B and C are here replaced by spur gears A and B fastened to the differential shafts C and D respectively. While the inner sides of the hubs of these spur gears come close together, the inner edges of the gears themselves are at some distance apart. Meshing with these two spur gears A and B are two, three or four sets of spur pinions; E, F. These pinions have a width of face almost twice that of the spur gears A and B. The outer portion of the face of each pinion meshes with one of the spur gears, and the inner portions of the faces of the pinion mesh together. It will readily be understood that if the casing of the differential G is held stationary and the spur gear A is revolved by hand or otherwise in a clockwise direction, the pinion E meshing with it is revolved in a counter clockwise direction; the pinion F meshing with E is revolved in a clockwise direction and the gear B is revolved in a counter clockwise direction. That is, gear B is rotated in an opposite direction to gear A, exactly as with the bevel gear differential. In regular operation the turning effort is, of course transmitted to the differential housing by means of gears, and the turning effort thus received by the housing is equally divided by the sets of spur pinions between the spur gears A and B; that is, between the two driving road wheels. The properties of the spur gear differential are exactly the same as those of the bevel gear differential.

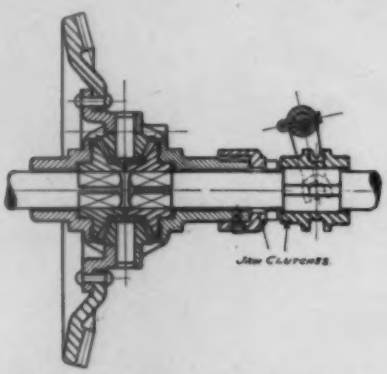


Fig. 10. A Neat and Simple Differential Lock

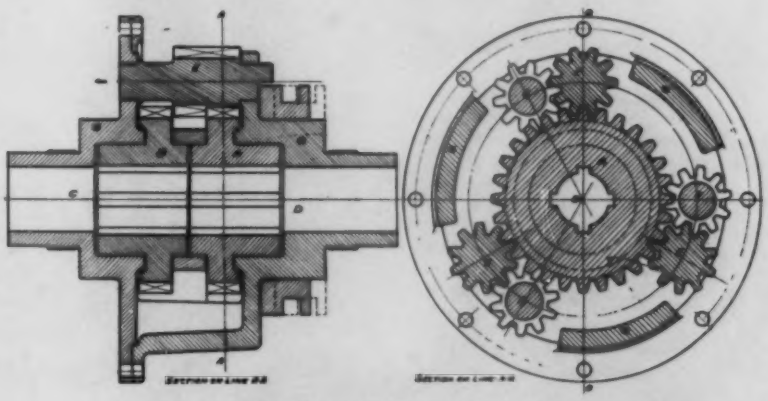


Fig. 9. Spur-Gear Type Differential

The problem of working out a neat and all round satisfactory differential lock presents considerable difficulty, which is probably the reason that this device is not more extensively used. Fig. 10 depicts this lock, which is in the form of a four jaw clutch, one member being keyed to a drive shaft and free to slide up on it, while the other is keyed to the differential case. Meshing the two clutch members locks the differential, since one shaft is locked against the other through the housing.

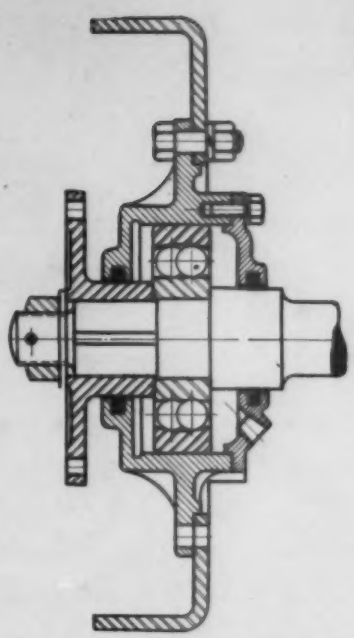


Fig. 11. Lippard-Stewart Propeller-Shaft Mounting

When all four wheels of the vehicle are used as driving wheels, it generally is necessary to provide three differentials; one in the transmission case to equally divide the turning effort between each pair of wheels and one for each front and rear drive.

Thus the differential is absolutely necessary in any form of final drives used on commercial cars, and it presents considerable advantages in protecting all parts of the mechanism against stress when turning corners. While it also has the disadvantage of stalling a vehicle when one wheel gets into a mud hole.

This disadvantage may be overcome by providing a differential lock, this again places the responsibility upon the operator and should he attempt to round a curve with the differential locked, the tires and driving mechanism would be subjected to considerable wear. Should this be done quite frequently, the results would soon be noticeable.

In order to overcome the latter feature, this lock is operated by a foot pedal and so arranged that it must always be held in engagement. Removing the foot pressure disengages the lock, thus providing for the poor memory of the operator.

Build a truck to stand what people will say about it two or three years *hence*. Your meanest competition is the car with a slight defect.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

A New Worm-Drive Federal

REALIZING the desirability of a worm drive in some lines of work, the Federal engineers have been working on such a design for some time and have amply tested it, with the results that the Federal Motor Truck Company, of Detroit, Mich., now offers this model in 3000 lb. capacity. Aside from the drive, the new model contains nothing new to Federal practice, all proven features being retained. Chassis weight is 4000 lb.

Motor

The motor has three-point suspension, has four cylinders, 4⅛-in bore, 5¼-in. stroke, cylinders are cast en bloc, with integral water jackets. Valves are conveniently placed, on the left side, and completely enclosed. Crank shaft and cam shaft are each carried by three large babbitt bearings contained in bronze shells. The extra heavy crank shaft is of carbon steel, heat treated, as also are the connecting rods. Their upper ends are bushed for the piston pins. Pistons are accurately ground to size and balanced.

Ignition is by waterproof high tension Eismann magneto with fixed spark. Stromberg carburetor is used, central jet, float feed type; gas control is by accelerator only. Motor lubrication by constant level splash system that has been a success in Federals for years. The radiator has an efficient cellular core to which separate top and bottom tanks are bolted, forming a very substantial construction easily repaired in case of accident.

Clutch and Transmission

The clutch is a pressed steel, leather faced cone, 16 in. in diameter. The forward end of the clutch shaft is carried by a self-lubricating bushing when free, six auxiliary springs underneath the leather allow very easy engagement and the throwout is so constructed that there is no thrust nor wear on the rollers except while clutch is actually held out.

The transmission is mounted on cross-members of the frame and coupled to the clutch by means of a short shaft with universal joints. It is a selective sliding spur gear, three forward speeds and reverse.

Drive

The final drive is by double universal jointed propeller shaft connecting transmission to worm geared rear axle. The reasonable length of the propeller shaft together with its generous tubular section avoids any possibility of whipping when coasting. The universal joints are of cross pin construction enclosed in grease tight casings.

The full floating rear axle has the worm gear mounted with the differential as a unit, its housing forming the top cover of a very massive axle casing. Axle shafts are chrome nickel steel, heat treated, outer ends have integral driving flanges which bolt direct to the hub flanges. Tapered roller bearings are employed throughout the rear axle.

Brake, Springs and Frame

Service brake is mounted on the transmission; rear supporting bracket is of the contracting type, with 10-in. diameter drum.

Emergency brakes are internal expanding; drums 16 in. diameter, 3 in. wide on rear wheels. Both emergency and service brakes have Raybestos friction surfaces and are very easily adjustable by means of worm gears connecting the operating lever with the cams or toggle lever.

Rear springs are 54 in. long, 3 in. wide, nearly flat when under load. Shackles are provided at each end and spring seats are integral with axle casing; driving and braking torques are taken by the springs, but sturdy I-beam section radius or push rods connect the axle casing directly to the frame side members, thereby controlling the relative position of the axle independently of the springs.

The frame is of pressed steel construction tapered from center to ends and narrowed at the front to allow short turning radius. All cross members are well gusseted to the frame sides.

Federal One and a Half Ton Worm-Drive Chassis

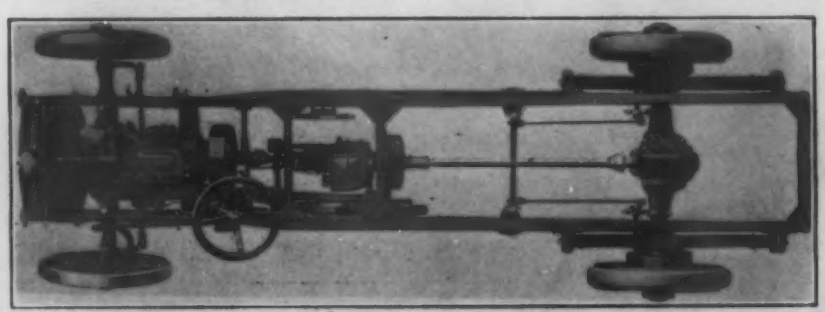
It conforms closely to standard Federal practice, except in the drive. Furnished in 120 and 144 in. wheelbases

Other Details

Steering gear is of the worm and wheel type, adjustable for taking up wear. Handwheel is 18 in. diameter, located on the left side of the chassis. Brake and speed levers are in center of chassis, allowing access from either side.

Motor speed is controlled by centrifugal governor and pedal operated throttle. Maximum engine speed is 1190 r.p.m.; this gives 15 m.p.h. with the 8.5 to 1 high gear ratio.

Wheelbases are 120 in. and 144 in., allowing standard body length of 102 in. and 126 in. behind driver's seat. The same principles of Federal unit body construction can be applied to this new worm gear drive chassis, and bodies most suited to the various lines of business can be supplied as requested.



Top View of One and a Half Ton Federal Worm Drive

Showing four-cylinder 4⅛ x 5¼ in. motor, cone clutch, three-speed transmission, worm-gear rear axle, left-side drive and center control

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

A New One and a Half Ton Truck by a Detroit Firm

The J. C. Wilson Company, 15th and Warren Avenues, Detroit, Mich., automobile top and trimming manufacturers, have just brougth out a one and a half ton truck. The personnel of the company is J. C. Wilson, president; Stanley C. Wilson, secretary; G. Earl Porter (formerly with the Admiral Motor Truck Company), designer, and G. A. Freeman (formerly with the Warren Motor Company), purchasing agent. The firm has been identified with the vehicle business in Detroit for years, and places the new truck on the market after several months of experimenting and study. The aim has been to incorporate in the design both simplicity and accessibility of parts.

Motor and Transmission

The motive power is furnished by a four-cylinder Continental having a bore of 4⅛ in. and stroke of 5¼ in. The cylinders of this motor are cast en bloc and the motor is three-point suspended. Ignition is by an Eisemann high-tension magneto and the carburetor is a Marvel. The radiator is of the built-up type with cast tanks and tubular core. It is mounted on springs which absorb the vibration.

The transmission is of selective sliding type, of Covert manufacture, the gears being 1-in. face. The transmission is bolted to the jack shaft and the two are mounted on a three-point suspension.

Drive Line and Axles

The drive shaft to the jack shaft is 1¾ in. in diameter, of tubular construction. The final drive to the rear wheels is by double side chain. The jack shaft is of Russel make, and the clutch and drive shaft of Hartford make.

The front axle is of I-beam section, extra heavy construction. The spindles at the inner bearing are 2 in. in diameter, and at the outer bearing 1⅞ in.

The rear axle is dead, 2¼x1¾ in., spindle at inner bearing being 2⅛ in. and at outer bearing 2 in. Both axles are of Sheldon make.

The Wilson One and a Half Ton Truck

A new truck by a Detroit concern, which has such standard parts as Continental motor, Sheldon axles, Covert transmission, Russel jack shaft, Hartford clutch, Eisemann magneto and Marvel carburetor. The price is $1800.

Springs and Wheels

The springs are semi-elliptic, front and rear, the front ones being 42x2¼ in. and the rear 50x2½ in. They are of the self-lubricating type, guaranteed against breaking or sagging for 2 years. Extra large bronze bushings are provided in the spring eyes and spring hangers.

The wheels are fitted with solid rubber tires, 37x3½ in front and 37x5 in rear.

Other Details

The frame is of pressed steel, channel section, 5½ in. deep, 2½-in. flange, 3-16-in. stock.

Both sets of brakes are located on rear wheel drums, there being no jack-shaft brake. The drums are 14x2½ in.

The steering gear is of the worm and nut type, and is adjustable so as to prevent lost motion.

The driver's seat and steering wheel are on the left side, control levers in the center.

Wheelbase is 130 in.

Price

The list price is $1800, the price including cab with storm curtains, oil lamps, mechanical horn, jack and complete set of tools.

B. A. Gramm's Trucks in Worm Drive for 1915

IN addition to its well-known line of chain-driven trucks, the Gramm-Bernstein Company, Lima, Ohio, will market B. A. Gramm's trucks for 1915 with worm drive. Four models constitute the additions, these being in 1500, 2000, 4000 and 7000 lb. capacities. They feature simplicity, the great strength of the one-piece, worm drive rear axles, and their not being held rigid by radius rods, but so mounted as to give the greatest amount of elasticity, giving greater life and reducing liability of breakage. The well-known Gramm center control and interlocking device is used, as on former models.

Attention is also called to the radiator which is of especially strong construction, with the rear shrouded to give all the radiation possible.

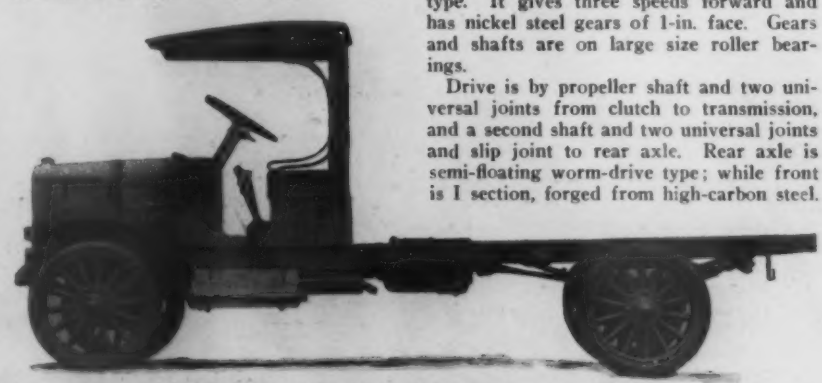
The four models are almost identical in appearance and design, with the necessary differences in size and strength of parts. A description of one with notes of the differences of the other, will, therefore, be sufficient.

The Three-Quarter-Ton Model

This model is powered by a four-cylinder, four-cycle, L-head motor of 3½ in. bore and 5 in. stroke. Cylinders are cast en bloc and have ample water jackets and enclosed valves. Carburetor is 1-in. size. Ignition is by high-tension magneto. Cooling is cared for by thermo-syphon, with large fan behind radiator. Lubrication is combined splash and pressure system, supplying all bearings and cylinders.

Clutch is dry plate, inclosed in flywheel and protected by case. Transmission is the well-known Gramm individual clutch type. It gives three speeds forward and has nickel steel gears of 1-in. face. Gears and shafts are on large size roller bearings.

Drive is by propeller shaft and two universal joints from clutch to transmission, and a second shaft and two universal joints and slip joint to rear axle. Rear axle is semi-floating worm-drive type; while front is I section, forged from high-carbon steel.



Side View of B. A. Gramm's Worm-Drive Truck

This view is indicative of the husky proportions of all the models

The CCJ has most readers because it gives most information

Springs are semi-elleptic, 2½ in. wide, made from silico manganese steel. Both brakes are internal, expanding on rear wheels. Frame is channel steel, 5 in. deep. Tires are 34x3 in. front, and 34x4 in. solid rear.

Worm and nut steering gear is on the left, with control lever in the center. A 15-gal. gasoline tank is mounted in the dash. Wheelbase is 118 in.

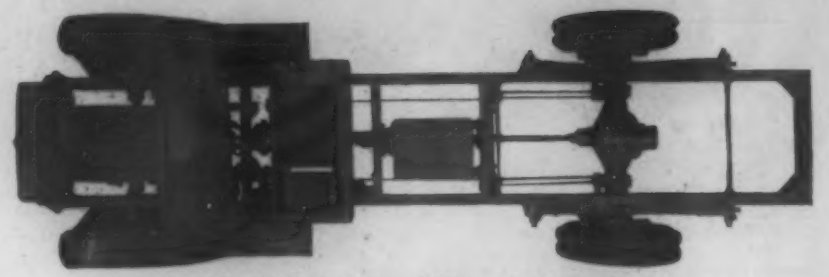
Equipment includes full set of tools, horn, two oil side lights and tail light, good jack and hub odometer. Chassis only, painted to order, is $1,350; body and cab top extra. Generator and electric lights, with 90 ampere storage battery, is $100, starter $100, or combined outfit $200 extra.

The One-Ton Model

This model differs from the foregoing in having a 9½ ft. space behind the seat, where the other had only 7½ ft.; 34x3½ in. front and 36x5 in. rear tires; 140 in. wheelbase, and $1650 price of chassis.

The Two-Ton Model

The power plant of this model is four-cylinder, 4⅛x5¼ in. It has a centrifugal pump for water circulation and cellular radiator. Front springs are 44x2½ in., semi-elliptic; rear are 56x3 in. Service brakes are 16x3 in., internal expanding; emergency 16x3 in., external contracting. Frame is 5 11-16 in. deep and 126 in. back of seat. Wheelbase is 146 in., tread 57 in. front and 62 in. rear. Tires are 36x4 front and 36x3½ dual or 36x6 single rear. Gasoline tank is 20-gal. capacity. Chassis lists at $2600. Otherwise, it is the same as the first model.



Plan of B. A. Gramm's Worm-Drive Truck
It shows the general layout of the components of all the models

The Three-and-a-Half-Ton Model

The principal differences between this and the two-ton model are a motor of 4½ in. bore and 5½ in. stroke; a four-speed transmission with direct on fourth; 44x3 in. front springs and 62x3¼ in. rear springs; 20x2½ in. brakes; 7 in. deep frame; 144 in. back of seat; 158 in. wheelbase; 62¾ in. tread in front, and 66 in. rear; 36x5 front and 40x5 dual rear tires, and $3400 chassis price.

Autocar Searchlight Designed for War Use

THE accompanying illustrations show the latest searchlight outfit, as designed and made by the Autocar Company, of Ardmore, Pa., for one of the belligerent powers. The chassis is regular Autocar construction, but is equipped with two 5000 candle-power searchlights mounted on separate carriages or sulkies with wire wheels and pneumatic tires, so that they can be removed to a distance of half a mile from the four cylinder engine generating outfit mounted on the truck. The props which serve as supporting legs swing upward, forming stretcher-like handles so that two men can pick up the outfit and carry it up the side of a mountain or on to high ground from which to command the surrounding territory, thus enabling an army to locate the enemy at a considerable distance. Drums on each side of the apparatus carry the cable through which the current passes to the light. This enables the car and generating apparatus to be completely concealed while the light itself is at a point of advantage. Two of these outfits are carried on each truck. The lower picture is a night photograph of one of the sulkies in operation.

During a recent storm throughout Pennsylvania, the electric light wires were greatly damaged, throwing large sections into complete darkness. The searchlight was brought in on a test as an assistant to the County's Gas and Electric Station at Ardmore. The light thrown along the wires of the dark roads enabled a crew of eight men to continue their work throughout the night, the lights being under the charge of Nelson S. Pringle, and the car Mr. Clayton, of the Autocar Company. This resulted in a rapid resumption of normal lighting conditions, which would have been impossible without some such device. The lighting company is enthusiastic over the assistance given by the outfit.

Autocar Searchlight Outfit

This outfit was designed for one of the belligerent powers. The chassis carries two 5000 candle-power searchlights on separate pneumatic-tired two-wheeled carriages, with stretcherlike handles which can be turned down, as shown, to form legs. These can be wheeled or carried up to commanding positions on hills half a mile away from the car, with the generating outfit.

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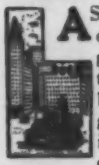
The Automobile War

By OUR FOREIGN CORRESPONDENT

Ground Clearance and Transmissions



AS pointed out at an earlier stage of the campaign, as soon as the ground began to get soft with the winter rains, and indeed even before that, the need for a high ground clearance began to make itself felt. This will not only conduce to a design in which the steering gear (including the rod connecting the two stub axles) is carried higher up, but is likely to react against the ordinary form of live axle with the casing of the differential and crown wheel lessening the clearance in the middle. In other respects it is pretty generally admitted that the live axle is a most satisfactory form of drive, but so long as the car has to traverse country where its whole weight may at any moment drop the differential casing on top of a boulder, or bury it in stiff clay, its drawbacks are obvious. From this aspect obviously the nearer the driving mechanism is to the wheels the safer it is, and for this reason chain-driven cars, though originally not favored by up-to-date military authorities, are likely to come back into favor again despite certain disadvantages.

It is quite possible, too, that we shall see something on the lines of the original Tilling-Stevens gasoline electric in which each back wheel was driven separately by a worm-driving shaft lying along the outside of the chassis frame; the same, but in a somewhat modified form, is already adopted on the two-ton Austin, which has already been illustrated in these pages.

Working Loose

In spite of the vast care that has been taken to ensure nuts and bolts being locked fast the roads of northern France and the Belgian pavé have succeeded in working many a one loose, and some cars might be improved in this respect.

Ambulance Work at the Front

Among the many private car chasses which have been bereft of their original bodies and fitted with light-field ambulance bodies for the front, American readers will be satisfied to learn that generally speaking the Ford cars so fitted are giving as good results as any: this doubtless in the main owing to their spring suspension and general flexible construction.

There is a growing feeling, however, that the private car chassis does not altogether fill the bill for this purpose: only the other day I asked an eminent surgeon of world-wide reputation, who had just returned from the front at Nieuport and seen the actual conditions of working, what he thought of the ambulances. "They are very nice for running in the streets of towns" was the reply, "but that is all. What is wanted is an altogether heavier, strong vehicle of larger capacity: something, say, on a 3000-lb. truck chassis with solid rubber tires."

Climatic conditions, too, are asserting themselves, and there is a growing feeling in favor of warming the ambulance tilts inside and providing such first-aid comfort as a warm water supply may afford. Quite a lot of ambulances are now being fitted with water tanks warmed from the exhaust, one idea being to supply a kerosene blow lamp underneath the tank when boiling water is required, relying on an exhaust branch coil for a constant supply of merely warm water.

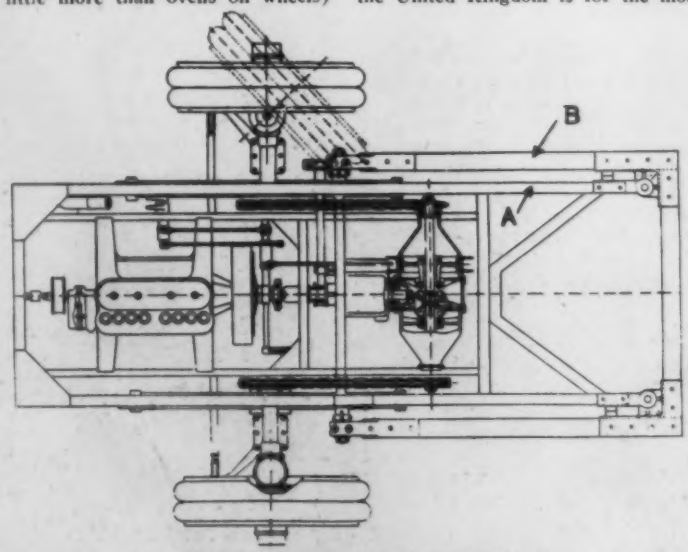
Motor Soup Kitchens

The Red Cross and St. John Ambulance Societies are going further than this, and are embarking on automobile soup kitchens for the supply of hot soup, tea, coffee, milk, etc., to the wounded at the earliest opportunity. These, as distinct from the military field kitchens (which are practically little more than ovens on wheels) consist of a comfortable caravan type of body fitted up with the necessary supply store accommodation, cooking facilities, "pots and pans" and "dinner service" in the shape of enamel iron mugs and so forth. The design of these bodies is largely a matter of the adaptation and fitting in of appliances already on the market.

Horse Motor Ambulances

One phase of the war which has received but little attention until recently touches the heart-rending sufferings of the poor wounded horses, in which of late the Purple Cross Society in France and the Blue Cross Society in Britain have been interesting themselves. These organizations are not only fitting out base hospitals but ambulances in which to carry the poor beasts. In London, moreover, the Society for the Prevention of Cruelty to Animals are appealing for funds to fit out twenty-five more ambulances, while Mr. Walter Winans and Mr. Vanderbilt have, I believe, already got horse ambulances out to the front.

And when I say "horse ambulances" in this case I mean "motor ambulances"—for carrying horses. Naturally the construction of these vehicles is very specialized, and in the United Kingdom is for the most part



Plan View of Mass Front-Wheel Drive Tractor

Power is transmitted from the jack shaft to sprockets on the inner ends of short shafts, which are above and parallel to the front axle. On the inner end of this shaft is a bevel gear meshing with another bevel gear passing through the stub axle pivot. This has on its lower end another bevel driving a bevel ring gear secured to the front wheel. This machine is especially fitted for use as a horse ambulance.

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in the hands of Dennis Brothers, of Notting Hill, London, (not the truck builders of the same name), who hold the patent rights for these bodies, which practically consist of an outer framework carrying an inner stall, that can be run out of the body on rollers down a ramp. This ramp when not in use can be slid inwards forming a false bottom underneath the sliding stall, or, when the car is loaded, it can be tilted upwards so as to form what is practically a very high tail board, securing the animal at the back. Attention, too, should be called to the rollers which the illustration shows on the side of the car, for the tractor can be fitted with an engine-driven windlass, which through the medium of the rollers can be utilized for roping the horse towards the vehicle when loading.

The peculiar requirements of loading a damaged horse into a vehicle require an exceptionally low loading platform. In the days of horse-drawn vehicles that was easily afforded by cranking the back axle. The advent of the motor, however, involves a rather special design for this work. Up to the present the most suitable machine for the purpose is what is known as the Mass tractor—a French-built machine—which drives on the front wheels similarly to the Latil, but it is essentially a two-wheeled conveyance adapted to be fitted to the front part of a frame which carries the body that is in turn carried on a single pair of wheels which constitute the back wheels of the combination.

The illustration shows how the power is transmitted backwards to a gear box and thence again forward by chains to the front axle, and how the front wheels are driven regardless of their pivotal movement for steering, the tractor frame being shown at A and the body frame at B. Obviously, this body frame can be swept downwards to any required degree behind the tractor, and it is only a matter of cranking the back axle sufficiently to obtain as low a frame as can possibly be required.

An idea of the type the war requirements are evolving in the way of automobile soup kitchens is afforded by the accompanying illustrations of one of these vehicles recently built by Brown, Hughes & Strachan, Ltd., of London. Such vehicles have to be built as cheaply as possible consistent with strength and wear. For the interior equipment, starting from the back on the left side there is first, a three-shelved cupboard with double doors and lock, 32x19 in. at the height of 28 in. from the floor. Under the cupboard are a couple of open shelves 44 in. long, the extra length of 12 in. forming at the top a shelf, or draining board, for the metal sink, 20x14 in., which lies next to it. This sink is served by a brass tap, the supply of water coming from a 14-gal. tank mounted on the outside of the body by the side of the driving seat. On the hooks above the draining board on the left are a set of sink, plate and scrubbing brushes. The equipment on the side is completed by a fire extinguisher, mounted on a small shelf in the near front corner.

Latest Form of Ambulance Soup Kitchen
This has been built by Brown, Hughes & Strachan, for the British Red Cross Society. An especially interesting interior view is shown herewith

The main feature of the body consists of four 5-gal. soup boilers, made on the familiar principle of the double porridge pot; that is, an outer pot containing the boiling water and an inner lining for the soup or other food. Two of the soup boilers are mounted on fireproof shelves, across the inside front of the body on either side of a central boiler of special design. This boiler is heated by a coil, fed from a tank placed near at hand on the off side, which supplies paraffin under pressure. The oil tank is nearly filled with oil, leaving a suitable air space at the top, and then a hand pump is manipulated until a working pressure of 25 lbs. to the square inch is registered. The cocks having been opened, the oil is lighted by placing a piece of waste or similiar material in the center of the oil. The water in the boiler above is rapidly heated, and the steam so generated is led away to each of the four soup pots by flexible metallic tubing attached to as many nozzles formed in the top of the boiler. The method of centrally heating any number of pots from a main boiler is a great advance on heating each pot separately, and, giving a distinct saving in fuel, is particularly adapted for service requirements. The main boiler is also provided with a 3-in. pipe running through the roof, and is furnished with a damper. On the off side of the interior, starting from the front, there is first the oil drum just mentioned, the intervening space between it and the back of the body being taken up by a dresser of three shelves, corresponding in length with the cupboard on the opposite side of the body. There is also a projecting shelf at table height both in front of the dresser and on the front seat corresponding to the board by the side of the sink on the other side. There are shelves under the dresser, while the dresser shelves are suitably furnished with enameled cups hung up in the usual way, together with tea, coffee, and sugar canisters, and other odds and ends of domesticity. At the back, on the off side, is a hanging oil lamp for use at night.

Ventilation is afforded by two lights in the side of the body 24x13½ in., hinged at the top and provided with the usual metal struts. There is also a large sliding light at the front behind the driver, 23x17 in., while in the roof there is one rectangular hinged ventilator and two of the cowl type.

The head room of the body is 6 ft. from the floor covered in sheet iron to under the

Type of Ambulance Used by the Russians
These machines are noteworthy for their complete enclosure, even of the driver. They are twenty h. p. Austins; 120 have been ordered

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

hoop sticks. The gangway is 31 in. between the dresser and the cupboard at table height, and, owing to the recess of the dresser shelves this is increased to 3 ft. 7 in. higher up, so that there is ample room to work and move about in the body.

The main part of the body, which is slightly over 6 ft. in length is matchboarded and built up on a frame of ash corner pillars, roof sticks and rails. A portion of the floor over the gear box is removable for inspection purposes. There is also a large folding step at the rear, 33x11½ in., giving access to the rear door, 26½ in. wide. Rigidity is obtained by fixing a stout body plate on the rear bottom bar of the body, which runs up a considerable distance on each rear corner pillar. The driver is provided with a cushion and back rest, glass screen on front and a wooden canopy overhead.

From the above particulars it will be seen that no stone has been left unturned in order to give effective service in the smallest compass, simplicity having been studied throughout.

Influence of Climate on Designs

On the eastern side the influence of climate is making itself markedly felt, as may be seen by comparing the illustrations with the canvas tilt type used in western Europe. Not only are the sides boarded to half way up, but the whole of the front is boarded, and the driver's seat entirely enclosed: indeed the Russian ambulances are a far more substantial job.

Russian Motor Workshop

In the ambulances we have seen the influence exercised on body design by the severe Russian climate: in the travelling workshops for the army we see the same forces at work. In cars of similar purpose run by the British, French and German armies the sides are made to fold out, the lower half extending the floor, the upper half extending the roof, but in Russia, generally speaking, the cold forbids such a course. Consequently the bodies are made with solid sides, the top part constituting one large window capable of admitting as much light as is likely to be required, and also capable of opening. As a further result the solid sided construction enables the body to be carried much lower and to be made wider, the tools being so disposed that the "paddle-boxing" of the back wheels does not get in the way. A large number of these workshop wagons on two to three-ton Austin chasses have been supplied, the engine power being made available to operate, through the gear box, winches for hauling or dragging purposes. The workshop installation consists of a Drummond 5-in. lathe, electrically driven, and also capable of being worked by a foot attachment; an internal and external grinder; a portable electric drilling machine capable of holes up to 1 in. in diameter; a three-deck bench with drawer and a 4½-in. vice; a fixed bench with the same size of vice; an anvil and portable forge complete with bellows, hood and chimney; and a foot-power grinder besides all the usual tool equipment. The power for this equipment is supplied by a 7 h.p., single-cylinder Austin engine working through a dynamo, which also affords all the necessary lighting.

Interior of Russian Traveling Repair Shop

Lathe, forge, grinders and hand tools make up the equipment. Power for the tools is supplied by a single-cylinder 7 h. p. engine, driving a dynamo, which also gives the necessary light. The Russian machine is of much more permanent construction than that of the other nations. Its enclosure against the severe climate in which it operates, necessitates the sturdy construction.

The Supply of the Supply Column

On the eastern side a new type of vehicle is making its appearance in the shape of tank wagons, a large fleet of which have been supplied to the Imperial Russian Government by the Austin Motor Car Company. These vehicles, which are of 20 h.p., have separate compartments for grease, oils and gasoline. Another fleet of trucks of the same power are fitted up for the transport of spare parts, the interior being fitted up as a store with shelves and cupboards In addition to this the same firm has supplied a fleet of over one hundred three-ton supply and transport trucks with the sides opening outwards and downwards, and the body fitted for tarpaulins to protect the load from the weather. Each of these vehicles is also equipped with an electric lighting set, including a searchlight. In all these cars, for the protection of the driver, the front seat can be entirely enclosed by curtains fitted with suitable lights in them

A further interesting type of car supplied by the Austin people to the Russian army consists of a fleet of forty-eight chasses of 50 B.h.p., carrying bodies fitted with an armored superstructure, comprising two revolving turrets to carry quick-firing guns

Interior View of English Soup Kitchen

Cupboards with enamel cups occupy each side. In the center, at the front, is a central boiler heated by oil. The steam thus generated is conducted by metallic tubing to the other soup boilers, which are of five gallons capacity. Economy is the strong point of this method.

Motor Supersedes Horse in Ice and Snow

The headquarters of the belligerent powers are so reticent that a special notice of the work of motors may be regarded as indeed noteworthy if coming from official sources. A report from the British headquarters in France relates how even the cavalry have abandoned their horses in favor of the motor. "During this war the cavalry have had to play many rôles, varying from charging with the bayonet to sapping and even mining, but November 23rd furnished a fresh experience even for them, a brigade being moved by motors, since the road was too slippery for horses."

This affords a rather eloquent settlement of the very contradictory reports received in Europe last winter, as to the effect on traffic of a certain heavy blizzard in America, when all the "horse papers" pictured the motor truck as absolutely helpless, while the American motor papers described the vain and pathetic struggles of the horses in the snow, we now know which to believe in future!

But the motor is not confined to the western side. Here is what a recent Russian communiqué says: "On December 4th, on the Pabjanice-Lack road, our armored motor cars, taking advantage of the darkness, dashed into a column of the enemy and dispersed it."

Truck to Supply the Supply Column

The tanks of these 20 h. p. trucks are divided into compartments for gasoline, oil and grease. Note the gasoline pump on top of the tank; also the K. T. non-skid tires.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

FUTURE EUROPEAN TRUCK SALES

Among British motor trade circles the selling of commercial cars in the future is becoming a rather pressing question. Not only are people beginning to ask themselves what will be done at the end of the war with the large numbers of trucks that will presumably return from the front, but the whole question of the dealer and commercial car sales is, with the widening of the commercial car sphere, forcing itself on the British trade.

On the first point the possibility of the market being glutted with second-hand cars at dangerously low prices cannot be neglected. It is probable, however, that even the military authorities do not know their own intention until the end of the war is more definitely in sight. In the meantime it is urged that the truck has shown itself as an essential necessity of army transport, and that those trucks that are worth bringing back from the front will certainly be worth using under peace conditions, while it is further suggested that, since experience has shown a necessity for trained motor drivers, those vehicles in the worst condition could be very useful for training purposes either in the regular or territorial forces, as it is certainly ridiculous to sacrifice a good new machine to the brutal usage of the novice's hand and foot.

AUTHENTIC FIGURES ON FRENCH PURCHASES OF AMERICAN TRUCKS

No doubt you have the information on your side, which, however, it may be as well to confirm: From Paris we have authentic information as to the actual numbers of trucks ordered by the French government during November. In all, these number 1740, and are composed of the following makes: White, 600; Packard, 450; Kelly, 340; Pierce-Arrow, 300; Jeffery, 50. During the same month the Russian government also ordered 198 Packard trucks of 2, 3 and 5 tons.

A Two-Wheeled Pneumatic-Tired Aeroplane Trailer, Made by E. & H. Hora, Ltd., for the British Army and Navy
Note the demountable and portable construction

WHOLESALE ORDERS AND WHOLESALE TERMS

The questions involved in the sales of commercial automobiles are very complicated. The problem is totally different from that of private car sales. Invariably the truck is purchased for purely business reasons, and as often as not the purchaser is an individual, or a firm, whose requirements involve comparatively large orders—orders more wholesale than those of many dealers. Even if the purchases were not made for purely economic reasons, the essential training of the purchasers would lead them under such conditions to expect wholesale terms on wholesale orders, and what is more, the orders that they can offer can and will obtain wholesale terms. Other things apart, the manufacturer frequently could not afford to refer such customers to the dealer, yet on the other hand the manufacturers must rely very largely on the dealer for distribution and for maintaining the vehicles in satisfactory service.

Dealers Look to the Commercial Car

Like so many complicated problems, this is simply one of conflicting interests. Hitherto the dealer has not given very much attention to the commercial car, but with the prospect of short money during and for some time after the war, business in private cars is likely to diminish enormously, and the dealer is beginning to realize that he will have to look to the commercial car for the mainstay of his livelihood in the future.

How the problem will be solved—if ever it is solved—can alone be shown by the gradual evolution of the trade; but active minds are at work trying to see a way through the difficulties which are being much discussed at the present.

EUROPEAN OUTLOOK NOT ROSY

Though in Europe the sale of the commercial car is booming, in well informed trade circles on the east of the Atlantic there is some apprehension as to the future after the war. In view of the big government orders many firms are extending their work and providing for increased output, and it is suspected that when the War Office contracts close at the end of the war there may be a slack period before civilian orders begin to come in in any adequate quantity, especially as there is the prospect of a large number of previously existing trucks being released from army work and returning again to the arcs of peace. The sudden boom such as has struck the truck industry is necessarily at rather a dangerous time, and it is quite possible that for a period after the war things may be rather tight, but it must be remembered that the truck industry at least is not dealing with luxuries, and that such a market is bound to recover itself before most.

The motorcycle sidecar, which is well known as a pleasure vehicle on both sides of the water, has been converted by the British army authorities into a war machine. Batteries of quick-firing guns mounted on motor cycle sidecars are being formed so that every army division may have at least one of the motor machine-gun batteries.

Speaking about an appeal by the Lord Mayor to the citizens of London to supply six armored motor cars at a cost of $9,000 each, the Brigadier General of the London Mounted Brigade recently informed the Lord Mayor of London that while a single armored motor car can be of enormous value, two of these cars working in conjunction and supporting each other would be worth a squadron.

A Design Made Some Time Back by the Bristol Wagon and Carriage Works Company
A handy little delivery van, which offers some useful suggestions, and allows the driver to get at his load very easily

The CCJ has most readers because it gives most information

Papers Read at the S. A. E. Midwinter Meeting

(*See Page 8*)

MALLEABLE IRON CASTINGS FOR THE AUTOMOBILE INDUSTRY

By DR. RICHARD MOLDENKE

IT is the purpose of this paper to discuss the qualities of malleable castings of special interest to the manufacturer of automobiles, to describe enough of the process to show how these qualities can best be obtained, and finally to draw whatever conclusions may seem pertinent.

The position occupied by the "malleable casting" in the iron industry is a unique one. Its value in commerce depends entirely upon the effect of a drastic and carefully applied heat treatment given white iron castings which would otherwise be unserviceable. * * * Since in automobile work resistance to shock is most essential, the points in the manufacture of malleable castings bearing specifically upon this property should be given special attention.

The process begins with the making of white iron castings. This material, if of proper composition and melted right, is the only one that will stand the application of very high temperatures, long continued, without damage. A gray iron, given the same heat treatment will come out of the "anneal" utterly ruined. A mottled iron, white iron just beginning to shade into the gray, will also come from the anneal of very poor quality. Hence the importance of so calculating the mixtures that the casting will leave the sand white in fracture. As this is a function of the composition (principally the silicon content), the temperature of pouring (to a slight extent) and the influence of the section thickness, it will be seen that there are great chances for trouble. Suppose the composition of the molten metal just tapped is perfect, the mere carrying of the ladles to a distant part of the shop may be sufficient to so cool it that heavier sectioned castings will come out gray in fracture, whereas right at the furnace, or poured piping hot, they will be white. Again, as between a silicon content of 0.45 and another heat with this element at 0.75, the former will give white fractures in castings nearly up to three-quarters of an inch thick, whereas the 0.75 metal poured into the same castings will be gray. Both compositions, however, when cast into thin work will give white iron. As to the physical properties in these two cases after annealing, it may be said that the 0.75 silicon metal in thin castings, when the right kind of molding sand has been used, will give fine, smooth and nicely machining castings, of indifferent strength and shock resisting quality, but amply good for ordinary purposes. In thick castings, in which this metal comes from the sand gray in fracture, the effect of the annealing is to open up the structure still further, allow oxygen to penetrate and attack the graphite somewhat, as well as the iron crystals, leave the fracture a dirty gray occasionally relieved by stripes of color such as seen in tempering steel, and as a consequence technically called "calico iron"; and in effect make a very weak and unserviceable metal, dangerous to life and limb, and altogether to be avoided at any cost. The 0.45 silicon castings, after annealing, when in thick sections, will be of good strength—say up to 52,000 lbs. per square inch if properly made—and everything that is desirable in malleable casting work, except that the skin appearance will not be as fine as with the higher silicon ranges, and the castings will not be as machinable, the tool tearing the surface somewhat, as it is of a steely nature. Similarly in thin sections, this low silicon metal is exceedingly strong, pliable and highly shock-resistant, but will not yield as fine a surface or machine as easily.

On the manufacturing side it may be said that running low silicon heats is no easy matter, for they are prone to run away and become so badly oxidized that the percentage of lost castings becomes astonishing. * * * Since malleable castings made by the cupola process are inferior in quality anyhow, these would never be made except with the higher silicon ranges, and would be used for such articles as pipe fittings, hardware, etc. The better grades of malleable are made in the air furnace, or still better in the open-hearth furnace, where it is quite possible to get low silicon metal safely when the business of making it is thoroughly understood.

Between 0.45 silicon metal—which is about the lowest safe point in good practice—up to 0.75 silicon—which is the highest safe point for the light grades of ordinary work, very thin castings often running up to 1.25 silicon satisfactorily—there is a range which each manufacturer tries to study with reference to the average class he makes. * * *

It is seen that the manufacturer of malleable castings has the power, if he has the ability, to so regulate his mixture and operate his melting process that he can produce a very high-grade material for automobile work, if the automobile manufacturer will on his side adapt the castings to be made to non-machining considerations, or if this may not be, arrange his machining to suit the metal produced. A glance at the constitution of the malleable castings will throw light on this matter. The average composition of the white iron as cast, 0.65 silicon, sulphur 0.06, manganese 0.25, phosphorus 0.175, and total carbon (all combined) 3.00, has a contraction (ordinarily called "shrinkage") of one-quarter of an inch to the foot. This is the average, as actually some portions of the casting contract 5-16 inch and others nothing at all, depending upon the design, the temperature of pouring, etc. The skill of the patternmaker comes into play here. Before undertaking a run in the shop single castings should be made, measured up to correct the pattern, and broken up to look for shrinkage spots to be corrected by the application of "chills." * * *

The annealing process or heat treatment given the white iron casting is a procedure peculiar to the malleable industry. Properly carried out, it means raising the temperature of the containers carrying the castings packed in an oxide of iron, up to 1350° F. at the coldest point in the oven. This means that the maximum is about 1450° F., the oven itself running considerably higher. After the material has reached this temperature, it is held at the same for at least 60 hours (good malleable can be made in less than 60 hours at full temperature, but it is so easy to obtain "underannealed" material that all specifications wisely compel the sixty-hour limit), and then allowed to cool as slowly as convenient.

The effect of the "anneal" is threefold. First, an expansion takes place which permanently restores half the contraction of the original white iron. Hence in effect patterns are made for malleable with the same "shrinkage" allowance as for gray iron. Here comes the necessity for not only a proper composition to allow this expansion to take place, as without the limits of the proper chemical composition it will not take place, but also a proper melting procedure. A badly melted heat will be so oxidized that in spite of the proper composition, other than the oxygen content, the metal will not anneal.

The second effect, which goes on simultaneously with the first, is a conversion of the combined carbon of the hard white casting, into a peculiar form of amorphous graphite, called "temper-carbon" or occasionally referred to as "annealing carbon," the German word "tempern" meaning this. The change was first studied by the late Professor Ledebur. Observation of the fractures made by the writer for every 6 hours during the annealing period, indicates that the structure of the metal slowly opens and that between the several crystal groups there is a precipitation of this carbon (looking like lamp-black) which gradually increases until the shade of the fracture changes from silvery white to a velvet black. With this change comes that from a hard brittle metal to a soft pliable one, for the matrix is now a steel, the carbon being mechanically mixed, although not as in the case of gray iron.

Unless the metal can expand permanently to allow this deposition to take place, there will be no annealing effect. Moreover, this is a precipitation from and within a solid which is not crystalline graphite, as in gray iron, for on heating a piece of malleable to a very high point and quenching, the carbon is redissolved while in the solid state, and the resulting white fracture looks like that of a tool steel, not the original crystalline structure of the hard piece. Hence the necessity of straightening a malleable casting only when cold. The interesting point in connection with this carbon conversion is that not only is it the basis of the great increase in strength observed in malleable over gray iron, in which the carbon is crystalline, and hence very much more weakening through the starting of cracks in the metal when strained; but the manner of deposition of the temper-carbon and its nature are such that if a malleable casting is punished ever so much in service and battered out of semblance, as it were, this carbon acts like a cushion in preventing the spread of the damage, and the portions of the casting adjacent to the damaged parts will be found as sound as ever. * * *

The third effect of the annealing process is the removal of some of the carbon from the surface portions of the castings. If a flat piece of malleable which has been made in the ordinary manner, with an oxide of iron packing in the annealing boxes, is put on the planer and successive thicknesses of metal taken off, and these analyzed for carbon, it will be found that while this is practically all temper-carbon, obtained chemically as graphite (with very little combined carbon remaining), the quantity will vary from very little at the skin to the full amount about a quarter of an inch inward. Therefore, at about an eighth of an inch inward will be found a carbon content which, when the piece is heated and quenched as for steel, will be as hard as tool steel similarly treated. * * * Accordingly, we have in the skin of a malleable casting not only a much sounder material, but also a stronger one. Hence also the suggestion to automobile engineers to

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so arrange their construction that a malleable casting gets a minimum of machining, particularly at points where strength is important.

Lest the above matter of skin and interior of malleable be misunderstood, the writer will state that many years ago he made tests on this point by cutting away the portions of special test bars in which the carbon had been reduced by the annealing action, and obtained the strength of the interior as compared with bars of the same cast not so treated. The results always indicated that in spite of the interior shrinkages the skin has an advantage over the interior of only a few thousand pounds per square inch in strength, and naturally so, as when the carbon was precipitated into the crystalline structure, even if afterwards removed, the spaces must have been left open. The claims made that the interior of a malleable casting is worthless are not justified. Again, malleable castings annealed in fire-clay, or so that no oxidation of carbon from the surface portions was possible, and the change in carbon alone could take place, showed a good high strength almost equal to that of castings annealed in iron oxides. Hence the necessity of taking every precaution possible to get as sound an interior as may be possible under the circumstances, in order to take advantage of the strength of this interior metal.

Still, for one who has made malleable castings in very large quantities, there is a strong temptation to call the interior of a malleable casting worthless, when going over the scrap piles of the dealers in this class of material. There is good malleable and bad malleable.

Referring again to the question of machining malleable castings, it stands to reason that with the carbon partially removed from the skin, there being therefore but little lubrication of the tool, the castings will tear badly, the operation being like tooling off wrought iron or mild steel. Again, with the comparatively low sulphur in the castings, there is considerable difficulty in getting good threads. To have good machining qualities means a composition which makes for poor malleable castings, and vice versa. To machine at all means accentuating the effect of the poorer and unsound portions of the malleable casting as against the stronger and denser ones. A medium course is that now pursued by the malleable founder. That it is not fully satisfactory to either him or the automobile manufacturer may be heard at every plant interested in the matter. What, then, is the proper solution of the difficulty?

The ultimate consumer would probably say: safety first, and ask that the most rigid specifications govern the production of the malleable castings—or any other castings—used on the car he buys. He is unquestionably right, for producing high-grade material, even at a sacrifice of the modern fetish of speed and tonnage, makes for real efficiency.

In the preparation of standard specifications for malleable castings, one underlying thought has always been that a sharply drawn line should be established between ordinary malleable castings and "specification" work. Whereas all malleable heats should be run as perfectly as the manufacturer knows how, the beginning and end of them are bound to be always somewhat inferior to the middle portions, in which good temperatures for pouring and freedom from undue oxidation ru'e. The beginning of a heat is apt to be cold, comparatively speaking, and heavy-section castings poured far from the furnace suffer accordingly. At the end of a heat, the temperature of the bath rises so high that with very low silicons there may be an actual bessemerization within the furnace, and so-called "high" iron, or metal full of blow-holes, and indifferent to the annealing process, results. This "high" iron is, however, much to be preferred to "low" iron, which results from annealing material having graphite in its make-up. This class of work is weaker than the poorest gray iron. The malleable founder unfortunately, always leans toward the "low" or high silicon side of the problem, as he has smaller losses, less attention to pay to the furnace end of the establishment, and fewer kicks from the customers on the surface appearance and machining qualities of his work.

In order to differentiate "specification" work from the ordinary, the demands for quality work were made sufficiently strong, but not at all too strong, that the manufacturer of ordinary material use the middle portions of his heats. As, unfortunately, all malleable makers think they produce the best grade of material, chances are taken right along, and all the iron cast goes into specification work. * * * It is an unutterable nuisance to have specification work side by side with the ordinary run of castings in a malleable foundry, as it is very difficult to get the men to pour at the right portion of the heat, as well as to select the favored parts of the annealing oven. Nevertheless the world moves forward and the wise manufacturer remembers that it is a business axiom to give the customer exactly what he wants, charging him accordingly. If only the malleable producer had the backbone to insist that he be fully paid for the extra care and trouble, all would be well. Instead, however, he takes the chance of slipping by and makes the same price for each class of work, hoping that the extra cost of the specification work will be carried in the general operation.

It seems to the writer, therefore, that the solution lies with the manufacturer of automobiles, through his engineers. Magnificent work is being done along lines of standardization. Why not extend this to the general design of the malleable castings used on cars, to the specification for manufacture and test, to the subsequent treatment in the automobile shop, etc.? The experience of the American Society for Testing Materials will serve excellently in this respect. The manufacturers were burdened with a multitude of specifications for all sorts of material of construction. They feared the advent of a society to regulate the matter. The result was, however, that hundreds of individual specifications were quickly reduced to a single one, the engineers and manufacturers getting together and settling upon a fair but good line of work. * * *

In the malleable field there is nothing required more urgently than specialization in given lines of work. Specification work should either be done in specially selected foundries, or become so general that all foundries must run accordingly. Again, whether in specification work or not, foundries should differentiate their castings into light, medium and heavy, according to the section, and keep furnaces, sprues, mixtures and cleaning facilities in separate departments and even buildings. Or they should specialize solely in given weights of castings, so that the heavy and light workshops shall become quite distinct. * * *

Since, however, it is quite possible to make light, medium and heavy castings in the same heat, provided the heat be run as if for heavy work only, and this gives the very highest grade of castings for strength and serviceability—other than a fine machining effect—it seems that the real solution, so far as the automobile industry is concerned, lies in the selection of existing plants in central locations for shipping, and the taking over of the complete capacity for automobile specification work only, to the exclusion of everything else. With proper contractual arrangements, and under the control of an inspection system operated by the associated automobile interests, the results would surely be satisfactory. Nor would an injustice be done the other establishments, for they would be free to take the work formerly done by the selected plants in question.

UNIVERSAL-JOINT EFFICIENCY

By C. W. SPICER
(Member of the Society)

A very large majority of the motor cars now being manufactured for either pleasure or business include universal joints in their construction. The efficiency of these parts is therefore of interest to every one connected with the motor-car industry as either producer or user. Until recently, so far as I am aware, there has been little or no information available on this subject. It has been known, however, by those who

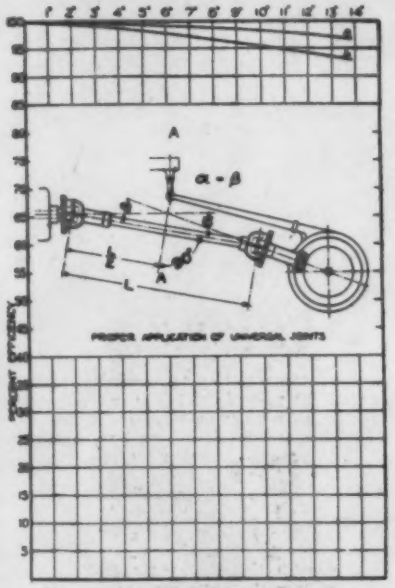

Fig. 1. See Text for explanation

have given the subject careful thought that the efficiency of a properly designed and applied universal joint is only a little below 100 per cent. This knowledge, coupled with the numerous difficulties incident to an accurate determination of the comparatively small losses involved, and the consequent refinements required for the determination, probably accounts for the meagerness of the available information.

	Angle of Deflection, Degrees (Each Joint)	Load Transmitted by Joints, Watts	Total Losses, Watts	Net Loss, Watts	% Loss	% Eff.
Forks in same plane	0	7444	2000	00	00	100
	3	7430	2000	70	2	98 5
	9	7400	2000	110	1 475	98 525
	9	7400	2000	110	1 475	98 525
	13	7420	4000	180	2 45	97 57
Forks at 90 degrees	0	7400	2000	00	0 0	100
	3	7420	2000	80	1	99 2
	9	7430	4000	340	2 27	97 73
	9	7370	4120	270	4 0	96 0
	13	7360	4260	415	5 6	94 4

Table 1. Showing Losses in a Set of Two Universal Joints No. 1. 800 R. P. M.

About 3 years ago Professor P. F. Walker, Dean of the Mechanical Engineering Department of the University of Kansas at Lawrence, undertook experiments which were carefully planned and worked out. The experiments, which were conducted on sets of universal joints furnished by the Spicer Manufacturing Company and by Blood Brothers, have been in progress much of the time since, having been completed only recently. The method of conducting the experiments, the data obtained and some of the results derived, are well described in a paper (by Professors P. F. Walker and W. J. Malcolmson, December 2, 1914) presented before the American Society of Mechanical Engineers.

I have three purposes in mind in drawing this subject to your attention: First, to emphasize some of the points brought out in the paper referred to; second, to develop some of the data given into some interesting curves not given in the other paper; and, third, to place the valuable information given in the records of the Society of Automobile Engineers.

Pursuant to the first purpose, it may be mentioned that:

(a) When the joints are properly designed and applied the power losses under usual working conditions are negligible—far less than is commonly supposed, judging by the number of applications to the U. S. Patent Office on complicated and freak designs with both plain and so-called ball or roller bearings.

(b) To secure the highest efficiency and absence of vibration, care should be observed in two-joint construction to have the yokes on the two ends of the intermediate shaft lie in the same plane. The effect on the efficiency is plainly shown by the curves in Fig. 1. The design should preferably be such that both joints will operate at approximately equal angles at all times. This can be accomplished by pivoting the torque arm midway between the joints and otherwise arranging the parts as outlined in Fig. 1. The pivoting point may be anywhere on the line *AA*.

(c) To secure the minimum of vibration, two joints disposed as indicated in paragraph (b) are better than a single joint.

(d) The efficiency is practically constant above about 10 per cent. of full load. When using very ordinary commercial grades of lubricant, the full load capacity is determined largely by the character of lubricant used.

(e) Between 10 and 100 per cent. of full load, the efficiency is above 90 per cent. for all angles less than 7 degrees. This is shown in Fig. 1, the curves being plotted from the data of Table 1. The column "Total Losses" in Table 1 refers to the total electrical and mechanical losses of the entire testing outfit. It is correctly assumed that there is no measurable loss at $O°$ deflection, and that therefore the watts lost when running at an angle, less the watts lost when running straight, is the loss chargeable to the joints.

New Truck Accessories and Parts Seen at New York Show

D-M ANTI-SKID TRACTION TREAD

The chief points of merit of the new anti-skid for dual truck tire herewith illustrated are the elimination of jolting or jarring to the truck, preventing injury to the tires, affording maximum traction under all conditions and easy application to the wheel.

This device can be quickly applied tc practically any truck tire of dual type regardless of clearance between rim and driving chain. The stagger and space between each section prevents skidding on wet or icy pavements. A special end section with crucible steel adjustable link, locks the tread to the tires. No special tool is required. Each section is 8-in across.

The D-M Anti-Skid
Made of staggerd sections which hook on to each other

Prices given are for a set, which consists of the sections required for two wheels with adjustment links and bolts; 34-in., 28 sections per wheel, $16; 36-in., 30 sections, $17; 38-in., 32 sections, $18; 40-in., 34 sections, $19, and 42-in., 36 sections, $20. This anti-skid is manufactured by the Dayton Malleable Iron Company, Dayton, Ohio

PARKER HYDRAULIC PRESSED-STEEL WHEELS

The Hydraulic Pressed Steel Company, of Cleveland, Ohio, is calling attention to its hydraulic pressed wheel which it is now manufacturing for truck use. These wheels are made in numerous sizes to fit practically any size tire now on the market. These wheels are made in two pieces, a front half and a back half welded together. In appearance they very closely resemble the artillery wooden wheel. Each hollow tubular steel spoke is under compression, because of the wedging action of the bolt and clip on the end of the spoke, and therefore maximum lateral stability is obtained. The wheel is made with ten spokes, and without a felloe. The ordinary demountable or tire carrying rim is mounted directly on the end of the spokes of the Parker hydraulic wheel.

"MIRRORSCOPE" REFLECTORS FOR TRUCK USE

The J. Alexander Manufacturing Company, 1931 Broadway, New York City, is placing on the market a line of hind view reflectors under the trade name "Mirrorscope," the same being particularly designed for truck service. The mirror, holder, arms, and fastening bars are all extra heavy to prevent jarring and racking to pieces when being used under extraordinarily severe conditions. Three sizes are furnished, two having 18-in. arms, while the other model is adjustable, being jointed in the middle. Prices are from $1.50 to $2.50.

The Allyne-Ryan Foundry Company, Cleveland, Ohio, exhibited at the New York Show some remarkable examples of grey iron castings. The particular points of merit in this company's castings lie in the clean, smooth, and finished appearance. As a sample of its work the concern showed an aeroplane cylinder having very thin ribs slightly more than 1/16 in. in thickness and closely set, each one of which was cast absolutely perfect.

SUPERIOR TRUCK LAMP

The Superior Lamp Manufacturing Company, 140 West Fifty-second Street, New York City, is marketing a new lamp for trucks, built on railroad lamp lines, all parts being made by machine and machine riveted. There is no hand work on the lamp. The top and bottom are crimped on and locked, this absolutely preventing the bottom from dropping out. The semaphore lens is 5 in. in diameter, and is held in by a moulding. This is the only detachable part of the lamp outside of the oil well, which is inserted on the inside of the lamp by raising a sliding door at the back. The balanced head draught system of ventilation is used and the lamp is guaranteed by the manufacturers to stay lit under any conditions. The entire lamp is made of steel tinned inside and outside, black enamel finish; price is $9.50 per pair.

NEW YORK CITY BUYS TRUCKS

During the past few days the International Motor Company has received an award from the New York Fire Department for twenty Mack High Pressure Hose Wagons, making a total of seventy-three pieces of Mack Fire Apparatus of various types supplied to the city by that company within the past 2½ years, and marks an epoch in the stride towards a complete motorized department.

The Bureau of Highways, Department of Public Works, has purchased six five-ton Saurer Tractors from the International Motor Company, to be used in connection with the Municipal Asphalt Company, 90th Street and East River, in the repair of asphalt streets when the contractor's guarantee of maintenance has expired.

The National Exposition Company has been planning to hold an exhibition of "Made in U. S. A." at the Grand Central Palace, New York City, from March 6 to 13. Invitations have been sent to motor truck manufacturers to exhibit their vehicles at this exposition.

The United States Mail Department, in Detroit, has bought three Signal trucks.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

Activities of the Motor Truck Association of Philadelphia

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COMMERCIAL CAR JOURNAL OFFICIAL ORGAN

DECEMBER MEETING OF THE MOTOR TRUCK ASSOCIATION WAS ENLIVENED BY A MOCK TRIAL

Judge Eugene C. Bonniwell and E. J. Cattell Presided at the Hearing of the Case

HOWLEY vs. JACKSON

BEFORE the largest crowd that has yet attended any of the sessions of the Motor Truck Association of Philadelphia, justice got a slamming when the Association presented its Mock Trial.

The case was tried in the Gold Room of the Adelphia Hotel. It set forth the charges made by farmer J. D. Howley against an unscrupulous motor truck agent who it was alleged had sold him a truck entirely unsuited to his business and against whom he appealed for justice. The unscrupulous one was E. B. Jackson, the President of the Association.

E. J. Cattell and Judge Eugene C. Bonniwell were associated as judges hearing the case, and they kept the room in an uproar with their flashes of wit. E. B. Jackson, of the Packard Company, the accused, with most excellent make-up and fidelity to details; John D. Howley, of the White Company, as the farmer, in a perfect rube get-up, proved a most vigorous plaintiff; Fred G. Browning, chauffeur for Howley was an interesting witness; Emlen S. Hare, Commercial Truck Company and E. M. Bartlett, of the Stanley Motor Carriage Company qualified as expert witnesses on gasoline trucks and certainly got their innings against the poor gas vehicles.

When E. M. Bartlett testified that he understood that Hare was to receive from Howley $200 for his testimony, George A. Barden, a most efficient tipstaff had his hands full in separating the combatants and restoring order, and it was agreed by all those present that little short Bartlett had big athletic Hare down on his back, and ready to cry quits, when tipstaff Barden separated them. This little incident afforded lots of additional fun as it was not figured on in the regular program. After quiet had been restored and everybody had a good laugh, Judge Bonniwell remarked that for a moment it looked to him as though the University of Pennsylvania ball team might have to secure a new coach for the next season as things looked very black for Hare.

Ross Walton, of the Firestone Tire Company, and George Simpson, of B. F. Goodrich Company, qualified as tire experts, and their answers to questions as to tire mileage and tire specifications caused much amusement.

Thomas K. Quirk, of H. Kaiser & Company, and L. L. Woodward, of Fitzgibbons & Crisp were the body builders who testified. Quirk testified that an 18-ft. hand-dump lumber body was not quite the right body for farmer Howley to use for hauling berries and farm produce to the city markets; while Woodward testified that his company was kept busy night and day building just that kind of bodies for farmers to use.

C. O. Raynesford, of the Packard Company, qualified as an expert photographer and produced photographs at the trial showing a truck loaded with 360 barrels claimed to be filled with apples which would give the truck a load of about 63 tons instead of 5 tons.

The light humor of these witnesses and the eloquent flights of oratory indulged in by the two councils, held the big audience for almost three hours.

Lee J. Eastman, of the Eastman Motor Truck Company, was the most eloquent and persuasive lawyer for the defense, and he won the case.

E. J. Cattell's charge to the Jury was most eloquent, and it was noticed that several of them were shedding tears when he was through.

In Judge Eugene C. Bonniwell's charge to the Jury, he explained to them that if they were to try the case upon the evidence which had been presented, they would undoubtedly sentence farmer Howley to jail for life, and present defendant Jackson with the City Hall, but if they were to come to a decision on the facts of the case, they would probably find the defendant guilty of all the crimes in the calendar, but to the judge's mind no evidence had been presented and there were no facts in the case, and that it was really beyond him, as a judge, to explain to the Jury how they should reach a decision, that after he had listened to the summing up of the case by George M. Graham, Prosecuting Attorney, that he was not quite sure who was the defendant in this case, and if the Jury could find out they might be able to reach a verdict.

Banquet of the M. T. A. of Philadelphia, Which Preceded the Mock Trial

Mr. E. S. Foljambe, made a very efficient clerk of the Court; W. H. Metcalf, of the Bartlett Garages, Inc., was foreman of the Jury, and after due deliberation Metcalf reported that the Jury found Jackson, the defendant, not guilty; but the Judges rebuked the Jury for what they termed palpable animadversion of justice, threw out the verdict, condemned the accused to ten years at Cherry Hill, and they reversed their decision by ordering farmer Howley to write a testimonial for the snake-drive truck he had purchased from the defendant and this closed the case.

Prior to the trial, the Association during the progress of the regular monthly dinner held its business meeting at which all the present officers and Board of Governors, E. B. Jackson, President; E. S. Hare, Vice-President; J. D. Howley, Treasurer; W. H. Metcalf, Secretary; O. E. Stoll, H. M. Coale, R. W. Cook, O. J. Doolittle and Lee J. Eastman as Board of Governors were unanimously chosen to serve for another term.

The Automobile Trade Association of Philadelphia attended this meeting as the guests of the Motor Truck Association.

The M. T. A., of Philadelphia, is just 10 months old and is growing very rapidly.

Combination Hose and Chemical Apparatus Mounted on One and a Half Ton Federal

Recently delivered to the Ontario Hose Company, No. 3, of Norwich, N. Y., by the O. J. Childs Company, Utica, N. Y. Body has a capacity of 1200 ft. of 2½ in. water hose. The chemical tank, Childs' manufacture, has a 40 gal. capacity, with 200 ft. of ¾ in. chemical hose and a connection for the water hose, so that water can be conducted through the chemical hose if necessary. The equipment was made possible by subscription lists and entertainments.

DISTRIBUTION OF G. V.'S IN SOUTHERN CALIFORNIA

A garage floor 100 ft. sq., filled to capacity with operating electric trucks owned by some of the leading business firms of Los Angeles, and steadily growing sales, all accomplished within a year from a "standing start," is the record of Harry W. Harrison, Southern California distributor of G. V. trucks and proprietor of the Commercial Electric Garage, 331 Wall Street, Los Angeles, Cal.

His success in selling trucks dates from the day he became convinced that, at least in Los Angeles, selling electric trucks was a proposition for a business man who could not only present claims, but prove them by tangible evidence, and back up intelligent pioneering done by J. Harry Pieper for the Edison Central Station Company, with a complete service that would give a truck buyer a going delivery system, and not a new delivery problem for solution. So he built a garage, took in a few stray electrics that had been sold by haphazard campaigning, and bought a demonstrating truck—sold it for cash to his first convinced prospect, and has been trying to replace his demonstrators as fast as they were bought away from him ever since.

Current from hydro-electric power, supplied by the Southern California Edison, is furnished on a very reasonable basis in Los Angeles, and such is the efficiency of Mr. Harrison's inspection and repair work, which latter is so light that it is done in a little corner of the garage, that truck repair expense is kept down to an almost negligible figure. The idea is to keep repairs down by keeping all parts in proper adjustment, through vigilant inspection, and doing little things promptly.

One of his customers tells of Harrison's going out as a matter of course and working all night with the men when a truck ran into the mud during last spring's floods.

Commercial Electric Garage and About One-Third of Its Contents

This is the home of G. V. in Los Angeles. Absence of hindrances to easy manouvering are especially commendable. It is one hundred feet square

In Los Angeles motor 'buses have become so numerous that the street car company threatens to reduce its service.

Republic Motor Truck Company, Alma, Mich., recently sold fifteen motor trucks to the Indianapolis Baking Company, Indianapolis, Ind.

Peninsula Rapid Transit Company will operate a 'bus line from 4th and Market Streets, San Mateo, Cal., down the peninsula by January 1, 1915.

Mt. Vernon, Ohio, has received its new 5000-lb. combination police patrol and hose car, ordered from the Peerless Motor Car Company, Cleveland, Ohio.

Highway Transportation Company is operating an auto truck service between Cincinnati, Sharon, Gano, West Chester, Mauds, Hughes, Huntsville, Bethany, Jericho, Monroe, Oakland, Blue Ball and Middletown.

Chicago Automobile Transportation Company has been granted a certificate of convenience and necessity by the City Public Commission, and plans for that city's first boulevard motor 'bus line are expected to go ahead at once.

The Trolley Construction Company, of Harrisburg, Pa., has been granted a franchise by the Kent County Levy Court to use trolley roads for a system of trackless trolleys. No tracks will be used, but electric motor 'buses, seating twenty passengers, will be operated from overhead current wires. The total mileage will be about 150 miles radiating from Dover, the county seat. Freight 'buses are also planned, and this has aroused the opposition of the railroads.

The Grace Methodist Episcopal Church, Chicago, is believed to have the first motor truck in continuous service of any church in Chicago. This truck is equipped for use and will hereafter gather clothing, furniture, etc., which will be used in helping the needy and in giving work to worthy men and women. The truck distributes burlap bags to homes wherever they will be received and when filled, takes them to the rooms where the contents are sorted, repaired and made ready for use. In the summer the truck will carry children to the parks and even to the country for fresh air.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

Some of the Fleets Used by Chicago Department Stores Along State Street

The fourth illustration from the top shows a few of the White cars used by the Hub. Note the peculiar body design

The CCJ has most readers because it gives most information

Six Hundred Commercial Cars Owned and Operated by Firms Within Six Blocks on One Street

Gasoline Cars Used For Long Hauls—Electrics for House to House Delivery—Former Horse Drivers Make the Best Truck Operators

By WALTER A. BERMINGHAM

CHICAGO department stores have more than six hundred motor trucks in daily service. It is estimated that there are more commercial vehicles maintained by firms within the distance of six blocks in State Street, between Randolph and Van Buren, where the big merchandising houses are located, than may be found in any similar area in the world.

The commercial car is by no means a young proposition on State Street. It made its debut with the birth of the industry, ran the vicissitudes of the pioneer days and is now keeping pace with present-day development. Within the past three years several new firms have adopted the commercial cars, and those which had previously installed machines, have made notable enlargements of fleets during that period.

The motor truck has been a successful departure in every detail. The reports generally of the superintendents in charge of the fleets indorse the economy and reliability of the commercial car.

An element that has served to improve the motor situation is the efficiency of the men who now handle the cars. Some of these men have been identified with the department store delivery systems for years, antedating the introduction of the motor truck. Because of their knowledge of the firm's business, they were selected to drive the original motor vehicles.

Electrics still reign supreme as the popular choice for house to house delivery. Gasoline trucks are used for the most part in making long hauls or carrying heavy loads, transferring between main stores and substations. Some are doing service in suburban districts, making deliveries from downtown stores direct to commuter customers.

Some users include Marshall Field & Company, Mandel Brothers, Carson, Pirie, Scott & Company, The Fair, The Boston Store, Hillman's, Siegel, Cooper & Company, A. M. Rothschild & Company, The Hub, and Charles A. Stevens & Brothers.

Many of the original cars installed by the stores are still in commission, and interesting stories are told concerning the performances of these pioneers, some of which, it is said, are holding their own with 1914 models.

The Largest Fleet in Chicago

There are some old-timers among the cars operated by Marshall Field & Company, who maintain the largest fleet in the Chicago department store field. This company has used commercial cars for eight years. It has dispensed entirely with horse-drawn vehicles at the retail store, and maintains only twenty-eight teams in the wholesale department. There are now two hundred and thirty-six trucks in commission, all of which, with the exception of ten three and a half ton Packards and five one and a half ton Whites, are in the retail service. The Packards are utilized for suburban trips, and the Whites are doing service in the wholesale department. The balance of the fleet, all electrics, make city deliveries.

Only two makes of electrics are used—750 lbs. capacity Walkers and one thousand lbs. and three and a half ton G. V.'s. The small electrics travel 25 to 30 miles daily, while the larger cars do between 30 and 40 miles. The gasoline cars in suburban service travel 50 to 60 miles daily.

The Walkers are used exclusively for house to house deliveries, while the G. V.'s are in transfer service between the main store and substations. The Walkers are dispatched from these substations.

The company has installed a most comprehensive system of determining cost of operating the automobile fleet. Each Field chauffeur makes a complete report on stops, mileage, gasoline and oil consumption, repairs and time consumed for each trip.

Carson, Pirie & Scott Second Largest Users of Chicago

Carson, Pirie, Scott & Company are second on the list among department-store fleets, with eighty trucks, including sixty-seven electrics. The entire fleet ranges from 1000 lbs. capacity to 4 tons. The cars have now been in use from three to four years.

Of the electrics, twenty-five are G M C's, twenty-three Detroit and nineteen Walkers. The gasoline trucks consist of eight G M C's and five Autocars. This company has not abandoned horses, maintaining two hundred vehicles of the latter type.

Each car handles from 100 to 350 packages daily and averages from 20 to 50 miles. The drivers make weekly reports on gasoline and oil consumption and delivery stops.

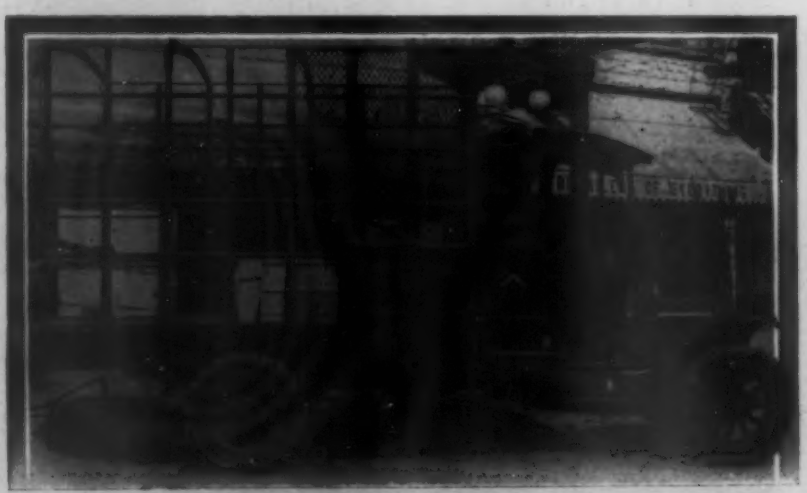
Sixty-eight Cars in Mandel Fleet

Forty of the sixty-eight cars in the fleet of Mandel Brothers are electrics. This company also continues horse-drawn vehicles, but is gradually placing more motor trucks in service. The firm maintains six substations, the larger cars of the fleet transferring between the main store and the outlying stations.

The gasoline cars are eight three-ton Packards, eighteen Whites and two Cadillacs. The Packards were installed in 1909, while the Cadillacs have been four years in service and the Whites from four years down.

The daily territory covered by the various gasoline types is 45 miles for the three-ton cars, 60 miles for the 3000-lb. vehicles and 75 miles for the 1500-lb. trucks. The electrics are sent over about 35 miles of city streets each day, making three daily trips from the substations. The average for each car is about 250 stops a day.

While A. M. Rothschild & Company still maintains seventy-five horse-drawn vehicles, the firm is most partial to the motor truck, and has a fleet consisting of twenty-two cars. The company first installed motor trucks three years ago, and has increased the number of cars in service each year. The large trucks are used for transfer purposes between the main store and substations. They average about 30 miles



A Platform-Stake Combination Body Used by Marshall Field & Company
This concern has two hundred and thirty-six trucks in commission

The CCJ has most advertisers because it gives them biggest returns

daily. The trucks used in house to house delivery service cover about 60 miles each day.

Hillman's Well Satisfied

The fifth largest fleet among Chicago department stores is that of Hillman's, the youngest of the merchandising houses on State Street. This company became a convert to the motor vehicle two years ago, when it installed ten 1-ton Macks. Last year it added eight Ford delivery cars and a 1000-lb. G. M. C. electric.

E. L. Janes, superintendent of the automobile delivery service, is enthusiastic over the showing of the Fords. He shows a list of figures in which the Ford is credited with doing 55 miles daily in delivery work. He finds that one Ford takes the place of two one-horse delivery wagons.

Figures show that the upkeep, etc., on each Ford delivery wagon, including salaries of driver and helper, has not exceeded $40 a week. The cars make two trips daily and average about 100 stops.

The Macks, equipped with solid tires, cover approximately 60 miles daily. They are credited with doing the work of two two-horse-drawn vehicles.

The G. M. C. electric, equipped with solid tires, covers 55 miles a day at a cost of $22 per month for current.

Cheaper Than Horses

Summing up, Mr. Janes allows for the newness of the automobile fleet, and figures that, up to the present, the cars have given Hillman's 40 per cent. more efficiency; it has been cheaper to maintain automobiles than horses, both in the cost per mile and the overhead expense. The company still operates fourteen single and double horse-drawn vehicles.

One Hundred Miles a Day by Siegel-Cooper Cars

Gasoline trucks exclusively make up the fleet of thirteen cars in the service of Siegel, Cooper & Company. They are four Gramms, four Grabowskys and five Autocars. Trucks of 5-3 and 2 tons capacity are assigned to transfer service between the main store and substations. One and a half ton trucks are used in suburban delivery service. The latter carry between 300 and 400 packages, and travel about 100 miles each day, a most unusual record.

The Autocars are maintained by outside contract even to the furnishing of gasoline and oil. The other cars are kept up by the department store.

Ten Whites and two Packards constitute The Hub fleet. Nine of these cars are kept in daily service, each averaging 61 miles a day. For a period of 6 months up to the first of December, the automobiles handled 113,000 packages, each car carrying approximately 100 packages daily, and averaging 9½ miles to the gallon.

Two-Compartment Body Used by Mandel Brothers
Curtains are fitted all around for inclement weather

Observations by a Pioneer

Mr. Squire, who has charge of the delivery department for Charles A. Stevens & Brothers, in regard to their delivery system said:

"We were the first company in Chicago to install an electric for delivery purposes. That was in 1897. We experimented in 1909 with the Orient buckboard, but found it unsuitable. We find the electric very well adapted to our work. Contrary to usual practice, this company has its electrics in use in suburban delivery, and find that they are all that can be desired."

These cars, of course, operate from substations and not from the store. They are two Walkers and a Waverley. The latter covers Evanston, a suburb to the north. One of the Walkers is in service on the north shore from Evanston to Lake Forest, a distance of some 20 miles. The other operates in the Oak Park district, west.

The cars are of 1000 lbs. capacity, and travel between 40 and 50 miles daily, making two trips from their respective substations. The average number of Oak Park and Evanston stops is 150 daily. The north shore car makes about 65 stops daily. The expense of operating the electrics is said to be in excess of that for horse-drawn vehicles used for the same purpose, but this is offset by the speedy and clean delivery.

SERVICE TO TRUCK BUYERS

There are innumerable ways of giving service to the buyer of a commercial car. Some of these methods are good and some bad, while still others are purely indifferent. It is the usual thing for a new owner to have some little difficulties with a new truck owing usually to his inexperience. Sometimes he wonders why the motor will not start or even give signs of life and after a trip to the dealer finds out that he forgot one little detail—filling the gasoline tank. Other times the trouble is a little more serious. In all such cases, the new owner naturally runs to the dealer with his troubles and the dealer is supposed to fix this up gratis. In many cases the service idea is worked to the limit, as the owner continues to call upon the dealer to make all repairs free of charge for a long time after he has owned the truck and is supposed to have learned to run and maintain it. As to just how far free service to the owner should be carried is a much mooted question and gives use to many arguments from the dealer as to how much money he can afford to lose on free service and from the owner as to how much repairing he can get done for nothing.

A rather clever method of settling this question without offending the owner and at the same time definitely settling the limit of free service has been thought out by the Kiel & Evans Company, of Oakland, Cal. This firm gives with each truck sold, a book containing two hundred coupons, each good for $.25 in service only (not materials). The coupons are made out as shown in the illustration. In the cover of the "Service Book" is printed the following agreement:

THIS SERVICE BOOK
No. 197

contains 200 coupons at the value of twenty-five cents each, in service only, at

KIEL & EVANS CO.
4th & Franklin Sts., Oakland, Cal.

or at .....
at.....and is issued for the exclusive use of.....
of.....County of.....
State of.....and it is understood that these coupons are not negotiable and are void if detached.

These coupons are good for twenty-five cents each in service at the following rates:
Lathe and Machine Work....$1.00 per hour
Mechanic's Work ..... .75 " "
Mechanic's Helper ..... .50 " "

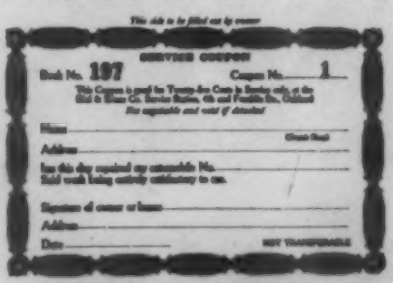
In addition to the above service you are entitled to the regular factory guarantee.

This Service Book to be null and void one year after date thereof.

KIEL & EVANS CO.,
Per.....

Date.....
Make of Car.....
No. of Car..... Motor No.....
Owner of Lessee.....

I hereby agree to the above conditions.
Owner of Lessee.....



Coupon From Service Book Issued by Kiel & Evans

Trucks on Steep Trails of Sierra and Coast Ranges

Motorization of Yosemite, Kerns River, and Sequoia National Park is a Success, and Trucks Are Putting Mining, Oil Pipe Line and Electrical Construction on a New Basis in California's Rugged Heights

By FRANK REED

ARE motor trucks making good on long, steep grades? This is a question which thousands of men, who will eventually be buyers of trucks, are asking. The material is available in California's great mountain ranges and desert foothills to prove an emphatic answer in the affirmative. This is true even when the query is so framed as to cover conditions of such severity as are found only in country which may with real propriety be called a wild and inaccessible mountain region. In this region photography is inadequate to give an idea of what the motor trucks are doing on many of the hauls through the big mountains. By the time the camera has been moved far enough away to take in a reasonable portion of what is there considered even a small grade, the image of the truck will be reduced to about pinhead size on the plate. If the truck is featured in the photograph, the grade will be so foreshortened that no one who has not seen the country can get an idea of what is intended to be shown. The grades must be climbed to have their severity understood.

Last June the present investigator for *Commercial Car Journal* met a Federal truck at 5500 ft. altitude, in regular service carrying supplies from Lemon Cove to Sequoia National Park. This is a run of about 40 miles with about 5000 ft. climb in the last 20 miles, nearly 3000 ft. of which is concentrated in one long, unbroken, winding pitch, from the Ranger's cabin to Colony Mill on the divide between the Marble and North Forks of the Kaweah River. Anyone, who wants to know, can find the gradients accurately reported in contour lines on the United States Department of Interior large scale map of Sequoia National Park. The Federal alternated with a Moreland, owned by J. F. Luttrell, of Lemon Cove. The drivers seemed to make the run as much a matter of course as do the men who handle delivery cars on Manhattan Island, but one is free to wonder if the engineers who designed the trucks had, beforehand, any conception of the actual conditions of practice which are proving the adequacy of their factors of safety.

Figures on Yosemite Commercial Line

A hundred miles or more north of Sequoia the government for the first time this spring admitted motor vehicles into Yosemite National Park. The first season the commercial traffic over the road from El Portal has been completely motorized, and that over the Wawona road motorized to a large extent. It is 14 miles from El Portal to Yosemite Village. In the first 8½ miles the road rises 1960 ft. Of this distance, the first 3½ miles lifts 887 ft., and the next 1½ miles, 500 ft., and the last 2½ miles of the 8½ is a typical mountain road, up and down, with 2150 ft. actual up grade in the total distance, and pitches running to 20 per cent. slope. In the first 6 miles there is not an inch of down grade. The road is of dirt, considerable clay. "When it rained it certainly did get slick" said a man who had driven there. Beyond the 8½ miles, there is good boulevard, of two kinds of macadam. Over this road the Yosemite Transportation Company, of Merced, Cal., is running two two and a half ton Morelands in combination freight and passenger service. A capacity load as normally made up is twenty-one passengers and forty suitcases. A truck during regular service carried 6129 lbs. of freight in a single haul.

Before putting on the trucks, people were carried in four-horse stages with a different four horses coming out, making a round trip an all-day matter. Twenty people was the largest number one man and four horses could get from El Portal into the Valley in a day. One of the Morelands has brought in eighty-nine passengers in one day. The schedule cannot exceed a certain speed set by government officials for pleasure car control. The schedule, which was closely maintained, was for the truck to leave El Portal at 7 a.m. and return there 11.30, start back to Yosemite Valley at 12.30 and be back at El Portal at 4.30. Three round trips have been made in 11 hours. With horses it was impossible to make even two trips. Running time for the truck is 1 hour, 25 minutes from El Portal to Yosemite Village. In ordinary service, one truck replaced sixteen horses and four men in actual work, with a 50 per cent. overtime capacity available on demand, while practically speaking the horses had no overtime capacity, as their endurance was not sufficient to make a one-way trip on top of their regular haul.

During the season, May 21st to September 1st, the two Morelands hauled close to 5000 passengers and 500,000 lbs. of freight. The average cost per round trip for the season was $.84½ for fuel, using distillate at $.12½ per gallon, and $.17½ for oil per trip. The table presented herewith gives detailed data of actual service in the period June 16th to 30th, which was about an average period, the earlier part of the season being a little heavier, and the later part lighter.

Cuts Mine Haul Cost to One-Third

Four hundred miles south of Yosemite, in the San Bernardino Mountains, Kirk Phillips with his fleet of Whites is giving remarkable service over the slopes and along the crests of mountains 5000 ft. in height. All through the Sierras here and there trucks are being used in various classes of commercial work. They have been used in regular service over the hard trails to Kings River Canyon, and way back into the mountains toward the Kern River from the valley. Over in the Coast Range, the Magnesite Company, of San Francisco, is running a five-ton Moreland between Livermore and its mine. Comparison with horse service as follows: Truck made the 31-mile run into the mine with twenty-two barrels oil and distillate, about a six-ton load. From the 6 to the 14 miles is a continuous 8-mile grade. Coming out the truck brought 4½ tons of magnesite and empty drums, making the round trip in 5

Report on the Yosemite Valley Transportation Company Trucks—Compiled From Trip Sheets—June 16th to 30th, Inclusive

TRUCK "CALIFORNIA."

Date.	Miles.	Dist.	Oil.	Pass.	Bagg.	Driver.
16	67.8	15½	4½	52	3050	Gibson
17	69.8	16	4	22	1100	"
18	30.2	88	1½	6	4000	"
19	30.3	7	1	0	5300	"
20	35.1	7	1	0	4500	"
21	35.1	8	2	37	1850	"
22	69.6	14	2½	59	2950	"
23	33.7	8	2	0	1500	"
24	34.6	9	1	16	4300	"
25	Did not run. Blocks under springs.					
26	35.2	9	1½	21	4050	"
27	31.4	8	1½	36	1800	"
28	69.6	14	4	42	7300	"
29	69.8	14	3½	0	9900	"
30	34.5	6½	1	0	4500	"
	646.7	204	31	285	56100	Gibson

Average per gal. Dist., 3.27.
Average per qt. Oil, 20.86.
Average weight baggage per trip, 2952.
Average number passengers, 15.
Number trips made, 19.

TRUCK "CHINQUOAPIN."

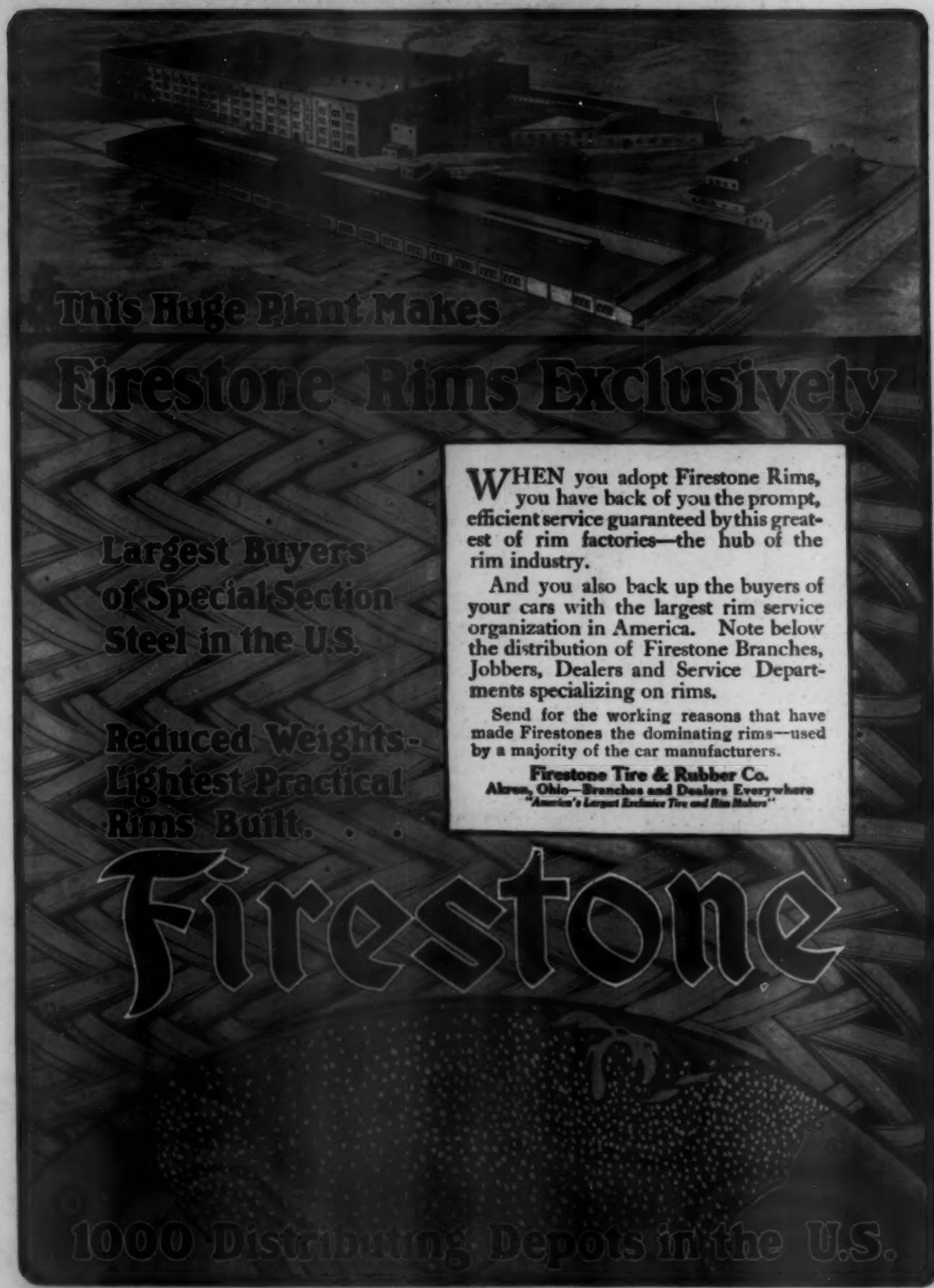
Date.	Miles.	Dist.	Oil.	Pass.	Bagg.	Driver.
16	63.4	14	3	63	3156	Ferguson
17	66.4	14	2	21	5050	"
18	32.	9	1	2	6229	"
19	29.3	7	0	0	4550	"
20	70.1	16½	2	57	2850	"
21	66.6	13	2	52	2800	"
22	67.3	15½	2½	47	6950	"
23	34.	7	1	21	3550	"
24	35.	8½	1	30	1900	"
25	36.8	7	1	19	4050	"
26	29.3	7	1	24	2700	"
27	35.	7	2	38	2100	"
28	67.9	11½	2	63	3350	"
29	69.8	13½	3½	42	6850	"
30	31.3	6	1	40	2000	"
	734.1	156½	25	519	58079	Ferguson

Average per gal. Dist., 4.69.
Average per qt. Oil, 29.36.
Average weight baggage per trip, 2640.
Average number passengers, 23.
Number trips made, 22.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

Trucks at Work in the Sierra and Coast Range Mountains

The above illustrations show some of the difficulties the trucks must overcome in mountainous work in the West, especially in regard to road conditions. Large picture, first column, gives an idea of the mountainous country traversed. The mountains are so big that the eye can hardly detect little pitches with 10 to 30 feet rise; nevertheless they are there, and in the sand. Note the auxiliary water tank above the engine hood. The load of hay is for the pack and saddle animals used in the narrow mountain trails, to which they are now becoming restricted. The illustration at the upper left shows a new way of rescuing a truck by taking a 6 ft. piece of 3½ in. pipe, and placing it between the tires on each rear wheel, and letting the truck climb up on it.


This Huge Plant Makes
Firestone Rims Exclusively
Largest Buyers of Special Section Steel in the U.S.
Reduced Weights-Lightest Practical Rims Built. . .
WHEN you adopt Firestone Rims, you have back of you the prompt, efficient service guaranteed by this greatest of rim factories—the hub of the rim industry.
And you also back up the buyers of your cars with the largest rim service organization in America. Note below the distribution of Firestone Branches, Jobbers, Dealers and Service Departments specializing on rims.
Send for the working reasons that have made Firestones the dominating rims—used by a majority of the car manufacturers.
Firestone Tire & Rubber Co.
Akron, Ohio—Branches and Dealers Everywhere
"America's Largest Exclusive Tire and Rim Makers"
Firestone
1000 Distributing Depots in the U.S.

hours. Formerly a six-horse wagon capable of carrying a three-ton load took 3 days for a round trip. It costs about $6 a ton direct costs for horse hauling, and it is estimated on the basis of experience now available that the truck will cut this to $2, without counting its service in hauling fuel oil back to the mine.

Truck Will Go Anywhere Horses Will, if Road is Wide Enough

The Southern California Edison Company is using a two-ton Pierce-arrow on a 64-mile haul through bad country. The truck leaves its terminal at 4 a.m. and the driver makes 14 miles before 7 a.m. when he gets breakfast at the summit of a rise about 3000 ft. above the starting point. Grades average 15 per cent. on the pitches, with nothing less than 8 per cent. and one of 29 per cent., and there is a fair gravel road. After breakfast he goes down through a pass, with the road on a narrow ledge most of the way, but crossing a dry river wash, down into the river bed, across through sand nearly to the hubs, and up the other side five times. Then he is on good road 5 miles, next 5 miles in sand, and then over country road to destination, total 64 miles. He gets his lunch at the 35-mile point and arrives at destination about 3 p.m., after which he does local hauling around camp. He always takes in a two-ton capacity load but is never overloaded, the company's rules being stringent on this point. P. H. Ducker, Superintendent of Transportation, insists on it, as it is not only good for the truck, but gives him a clear record and a clear conscience should occasion arise for enforcing guarantees on either truck or tires.

On the following day the truck makes the return trip light, in about an hour less time, and the driver loads ready for his early start next morning. This truck replaces two eight-horse teams, each of which took 6 days for the round trip, alternating their hauls. Under horse conditions the interval of 3 days between trips sometimes brought the men short of some needed provisions or supplies. The horses carried more to a load, but it cost more, and did not haul any more material to the month, and sometimes difficulties were experienced due to horses laid up. The teams ruined the roads, while the truck has a tendency to pack them and make them better, although frequent travel of cattle runs the sand down at the sides. This does not give the truck the benefit of its own road building, but makes pretty hard pulling all the time.

For this class of the work, where roads have been established by standard gage wagons, it is very important not to have a truck running over this width. The truck Mr. Ducker uses on this haul has 56-in. tread. He tried one with 4 in. wider base, which he believes for this reason alone, could not make good and he had to take it off the haul. It tore up four back tires on the trip. He points out the absolute necessity for manufacturers to take this into consideration in designing trucks to be used in this kind of country. He positively will not consider anything over 56-in. tread in buying a truck for bad hauls. If a truck gets imbedded down in sand, they take a piece of 3½-in. pipe about 6 ft. long, place one end between the tires on each rear wheel, slant the other up on the sand, start the truck, and she climbs out in good shape, the pipe acting very much like the car replacer used by street railway men. Before hitting upon the pipe method they tried boards, which would be shot all to splinters and sent flying out of the ruts, without giving the truck a chance to move.

The company has a blacksmith shop at its camp but has little occasion to use it even for slight repairs. Mr. Ducker says that, if the shop were taken away, he could continue to operate the truck, and that a man, who knows how to pick out a truck, is safe in going into the market to buy a truck for this kind of haul, without a repair shop anywhere near it, provided he will put the truck in charge of a man who has sense and knows how to treat it. It will go anywhere horses can pull a load. Mr. Ducker was very careful in picking and trying out the man to put on this truck, and then, to develop his initiative and self-reliance, and get a line on the machine, turned down his requests for various little things to put on the truck for a period of 3 months before he finally let up and allowed him a few accessories which made it a little more convenient. This haul is in hot country, with water scarce. The truck averages 7 miles to a gallon of gasoline.

Steady Service on Famous Mt. Wilson Road

Notable service within sight of Los Angeles is being given by two Mack trucks hauling construction material and supplies to the solar observatory on the top of Mt. Wilson, 6000 ft. high. The first three-ton truck put on the line was wrecked by backing it off the road, through no fault of the truck. George D. Jones, Superintendent of Construction and Transportation, Mt. Wilson Observatory states, "The mountain road is 9 miles long from foot and is about 10 per cent. grade, but in places it goes close to 20 per cent. for short stretches. The difficulty of this road is its extremely sharp turns and the steady grind with no level places long enough to give any cooling to engines. We do not stop to cool down even in the hot summer days when it about bakes one even to sit in the sun (one place is named Hell's Kitchen for good reasons). There is an additional water supply on trucks, as shown in the accompanying cut, and it is giving satisfaction. Other than this there is no additional change in cooling from stock cars. The speed is reduced to about 10 m.p.h. in high by increasing size of sprocket on rear axle.

"The trucks make only one trip a day as loading, etc., make it difficult to make more, but I would not hesitate to make two trips a day if needed and probably will during the busy season of 1915. It takes about 10 to 16 miles running about each day for loads besides the trip up the mountain and the difficulty of loading of materials makes two trips rather strenuous work."

The one-ton Mack truck, Mr. Jones says, "has been in continual service except when weather conditions made the road impassable in winter. It takes its capacity loads and sometimes a little more, but doesn't often overload. There is not much to say except that truck is always on the job and has made good. There has been no general overhauling done and no repairs other than a few worn parts such as chains, sprockets, etc., made.

"The second three-ton truck was put to work this year and worked with capacity loads until material was up this season. From April 15th to August 1st, it took not less than 275 tons to the top of the mountain. A great deal of this hauling is difficult, owing to length and shape of materials. We have taken full loads, and up to 40 ft. long, which is a difficult operation. I would not hesitate to take 5 tons on this truck, as I believe it would do it all right."

Fourteen in San Diego—Imperial Mountain and Desert Haul

The daily freighting of agricultural products, including cotton, and general supplies, on the return trip between Imperial Valley and San Diego, across desert and mountains, is another demonstration of motor truck efficiency. The Moreland trucks make the 128-mile run between terminals in 15 to 16 hours; 75 miles is through the mountains, the rest across desert. Melons and other perishable products come out of the valley to San Diego which is a new market not easily available before the trucks were started. Trucks make stops at many little hamlets and houses, leaving ice and fresh meats and staple provisions, and pick up about an equivalent weight of local products on these stops, so there seems to be no empty haul problem, thus helping to keep rates low. A great deal of country is reported to be in process of development as a direct result of this service. A recent contract is for freighting 3000 turkeys from Imperial to San Diego. Cotton raisers will ship their products to port by truck, while the city resident consumers of fruits and garden products get the benefit of the extra long growing season of Imperial Valley. The Morelands employed, fourteen in number, are all of the worm-drive type. These trucks are operated by the Moreland Motor Transportation Company of San Diego.

Oil Companies Receiving Splendid Service From Trucks Under Severest Conditions

The big oil companies of California find that trucks give them the speed they need in providing for the control of their valuable products. In handling well supplies, camp equipment and provisions, the trucks have to get right in amongst the foothills, traveling over roads deep in sand and alkali, and in the hills they often have to break their own trails to get to the wells. Pipe line construction, particularly across the Coast Range to shipping points, has given trucks plenty of chances to show what stuff was in them, and they have made good here as well as among the wells.

The Union Oil Company is using two trucks in the Puente Hills, southeast of Los Angeles. In most states these hills would be called pretty good size mountains. The trucks are used in construction work, hauling all kinds of material. This same company has used trucks in building pipe line.

The CCJ has most advertisers because it gives them biggest returns

To Present and Prospective Users of Motor Trucks:

EFFICIENT truck service—as rendered by The White Company—has two distinct functions: First—*Service at the time of purchase;* Second—*Service following the sale.*

By far the most valuable to the truck owner is the *first* named. The truck buyer will feel secure in his choice when he decides upon the White. He is entitled to the assurance of *selection to fit his needs*—and to enjoy this he must have the counsel and co-operation of engineers and transportation analysts who are not only most highly skilled in putting *built-in service* into trucks, but capable of telling the purchaser what he should have to meet his particular needs.

Complete truck service—White truck service—begins the moment the prospective buyer indicates his willingness to have the economies of motor truck use proved to his satisfaction.

White engineers have not only developed a product which in itself demonstrates that a White truck is the *right* truck, but their service in advance of the sale insures the buyer getting the *right White.*

WHITE Supremacy Is the Result of Double Engineering Efficiency

—an efficiency that is applied with equal fidelity to both tasks. In such service there is protection against buying a truck larger than one needs—or of unsuitable design and equipment—or against buying a truck that is too small for the work it is to do.

The truck for *your* job—fitted to *your* needs—given an individuality that means perfect adaptability to *your* hauling or delivery problems—is the truck The White Company is prepared to make for you.

Great fleets of Whites—owned and daily operated by scores of the largest concerns in America—afford ample proof of White efficiency.

The point we emphasize here and now—at a time when proper attention to the home demand and the home market is so vital a thing—is that the very same efficiency which has made White supreme among the big users of trucks is at the command of the one who requires only three trucks, or two, or one.

This is an invitation to any person—of whose business the hauling or delivering of raw products or finished merchandise is a part—to write to The White Company for complete details regarding pre-purchase service.

Your request for information will have the immediate attention of transportation analysts—their reply being based upon the requirements of your own hauling problem.

White trucks are of all sizes—for all uses. They are doing profitable work in cities, in towns, in country, in camp, on milk routes, with fire departments—under every condition and at an endless variety of tasks.

Their leadership in all fields is a daily demonstration of sturdy character, mechanical correctness and high quality.

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Boston	930 Commonwealth Ave.	Atlanta	63-65 Ivy Street	Newark	33-35 William Street
San Francisco	Market St. and Van Ness Ave.	St. Louis	3422 Lindell Blvd.	Dallas	2025-2027 Commerce Street
Baltimore	Mount Royal and Guilford Avenues	Toronto	14 Alexander Street	Washington	1233 Twentieth St., N. W.

Near Paso Robles was a pitch so steep that they had to reduce the load to two joints of pipe, where they usually haul sixteen on full load even up the hills. They think truck and tire manufacturers understand what is needed for this kind of work, and are turning out the product.

The General Petroleum Company is using a three-ton Packard carrying capacity load on a 60-mile haul over some bad grades between Mojave and Lebec. What was a three-day trip for horses in this hot desert country of alkali and terrible sand is made in 6 to 10 or 12 hours, with two stops. Another run covering some severe grades is out of Taft to the neighboring oil fields. There a three-ton Packard and a one-ton Kissel truck are used. This company reports that during certain pipe line construction it was employing a two-ton truck making a round trip 125 miles in the mountains and back each day. They used pneumatic tires and were in the habit of overloading the truck. Sliding in the mud and dodging around boulders made this a zestful trip for the driver. One time after a rain they used the whole of a big coil of one-inch rope, and twenty men to hold the truck on the road in a bad place. The chains would just give her a good grip on the outer coat of mud to slide it off the hard bed below and the truck along with it. Mushy top directly on flinty hardpan is what rain makes in some California soil. In this service, due to road conditions and also overloading when considered necessary, springs have given a little trouble and they provide against this by putting four-ton special springs under the trucks. Tires hold up all right, and no other troubles are noticed. The hardest work on tires is from Taft into the oil fields where they carry iron-pipe, well casings in 20 ft. lengths weighing 40 lbs. to the foot. They make the 85-mile round trip between Taft and Lost Hills in one day with heavy load through all kinds of hills and sand. Wherever they have to supply a new well they go ahead and break a road. Horses and mules are used only for local hauling, not at all for the long hauls. Mr. Crawford, the official of this company who buys trucks as a small part of his duties, considers that the manufacturers are working on right lines to produce the kind of machines required for this kind of severe service.

The North End Transfer Company, of McKittrick, has done some wonderful things, working three Pierce-Arrow trucks, hauling oil well supplies. They use two-inch pipe with a flattened end for getting out of the sand when they have to. Goodrich tires with cross grooves which grip the sand are being used instead of old style block tires. The rubber composition in these tires is such as to stand alkali and hard baking.

Pick Up Fruit and Vegetables in Sand and Deep Tillage

Ranchers and orchard operators who have seen trucks making good on bad roads are beginning to introduce them for hauling fruits and vegetables. The pick-up problem has caused a good many of them to wait. It looks like too much of an investment to have horses for pick-up work and a truck for the road work, although they get a big advantage, if they have enough tonnage and distance, in using a truck for the road hauling. In the country around Los Angeles there are quite a number of White trucks used by ranch and fruit land owners, handling pick-up work in the soft ground with no difficulty. O. R. Fuller, the White dealer in Los Angeles, has become so accustomed to this that he has quit keeping close tab on new cases. The Jeffery Quad is also performing well in this class of work.

In general it can be truly said that where a man knows his operating conditions, buys a truck to suit them and uses an intelligent driver, the best of satisfaction is given by trucks in these, perhaps, the most severe conditions encountered anywhere.

DEALERS *vs.* BRANCH HOUSES IN KANSAS CITY

By W. D. MENG

The dealer in trucks has hesitatingly scouted in the offing, at Kansas City, for some time, because of the presence of twelve branch houses of motor truck companies. The field seemed limited, and even the branch houses did not seem to be getting all the business—large purchasers of trucks went over the dealers', and even the branch house, heads and bought directly from the factory. The independent looked at the initial high price of trucks, the few sales as compared with pleasure cars, the enormous expense of carrying repairs and maintaining service stations.

But a change is observable in the situation, and several firms here that formerly dealt exclusively in pleasure vehicles are carrying trucks. One element is the lowering of the prices; another the elimination of the free inspection service for 12 months after delivery that was so expensive; another is that the factories are making better propositions to the dealers. Altogether, the dealing in trucks is looking more and more attractive, and the business seems to be within the reach of the average man who wants to enter that field.

It is said that the inclination of the factories to take on dealers in Kansas City is the outgrowth of an unique situation that probably does not prevail in any other city of its size. There are seventy-six large business concerns in Kansas City that use trucks, that are branch houses of national organizations. They maintain large fleets, with their own repair departments and, in the case of electrics, their own charging stations. When it comes to buying more trucks, the local manager is not permitted to purchase them in Kansas City, it is understood. He must take the matter up with the head office. The head office buys the trucks at the factories and ships them to Kansas City direct, ignoring the local manager of the company and the branch house of the automobile company. Usually the first the local agent of the motor truck company knows of the sale is when he sees some of "his" trucks on the streets.

Such a condition has been discouraging to dealers, who believed they were entitled to a show for their white alley.

But it was equally discouraging to local agents—and it has, it is said, resulted in the conviction at the factories that branch houses are expensive luxuries. Hence the chance for the dealer at Kansas City.

Willys Utility, of Angelus Laundry, Los Angeles, on Some Bad Going

Although it has its share of boulevard travel, it also makes some trips where the going is very heavy, in the hills in the northern part of the city. It is here illustrated on Second Street hill, where it climbs 300 ft., with an average grade around 25 per cent, over rough roads with ruts running to 14 inches deep. This truck takes out 800 lbs. to as high as 2200 lbs. of flat work at a load. The standard allowance for the body is 500 lbs. but this is equipped with a steel body weighing 900 lbs. Pneumatic tires instead of the usual solid tires on the rear wheels were provided at the request of the owner, to give the truck a more classy appearance in keeping with the highly finished body with limousine lights. This truck is making 12 to 14 miles on a gallon of gasoline.

The CCJ is the only truck journal a member of the Audit Bureau of Circulations—Why?

A CLEAN SWEEP

Every gasoline worm-driven car at the New York Show was equipped with a Cleveland Worm and Wheel. The following from the New York Sun tells the story of the ultimate drive:

"A well-known axle manufacturer, acquainted with practically every automobile manufacturer in the country, counted twenty-one automobile engineers in the Jeffery booth Tuesday night. All of them came in to examine the worm drive on the Jeffery Chesterfield Six.

'Every comment that I heard,' said the axle builder, 'was favorable. One talked about the superior strength; another about the greater power efficiency; another commented on the silent running; and everyone agreed that freedom from damage through chipping, stripping and the elimination of friction meant an axle that would outlive even the car itself.'"

An announcement of one of the greatest manufacturers of automobile trucks in America will be made shortly, indicating the effects of the expert work which we have been doing with this company for the past year and a half on worm drive.

The Cleveland Worm & Gear Co.
Cleveland, Ohio

LAST CALL FOR COPY

Western Review Special

(FEBRUARY NUMBER)

Commercial Car Journal

This is the issue in which will appear illustrations and specifications of every truck made west of Ohio.

No opportunity will be afforded manufacturers to exhibit commercial cars at the National Shows this year.

For this reason the February issue of the COMMERCIAL CAR JOURNAL is planned to take the place of the Chicago Show.

This special number will be a more complete exhibition than any show, for the reason that a greater number of manufacturers will be represented

Rates and further particulars are yours for the asking

Commercial Car Journal PHILADELPHIA PENNA.

This is the lightest of our eight electric models. Capacity 1000 lbs. Chassis price, without battery,

$1200

This is the lightest of our eight gasoline models. Capacity 1500 pounds. Chassis price,

$1090

DOESN'T it seem reasonable to believe that the largest company in the world building both gasoline and electric trucks might be able to help you straighten out your delivery and haulage problems? If it does strike you that way—write us to-day.

GMC
GENERAL MOTORS COMPANY
TRUCKS
Gasoline *Electric*

Experienced operators of power vehicles know that motor trucks pay big returns on the investment only when they fit the service in which they are used.

Your natural question is "what trucks will best fit *my* business?" This all depends on the length and tonnage of your hauls, the nature of your roads and the character of your work.

Generally speaking, in congested traffic and frequent stop work electric trucks excel, while gasoline trucks make the best showing when the hauls are long and the stops relatively few. The individual conditions surrounding *your* work, however, may modify this general rule.

In answering your important question "what trucks are best for me?" doesn't it seem reasonable to believe that the largest company in the world building both gasoline and electric trucks might be of some assistance?

As the largest manufacturers of gasoline trucks from 1500 lbs. to 5 tons capacity, and electric trucks from 1000 lbs. to 6 tons, we have no prejudice in favor of any particular truck. We can afford to be unbiased in our advice, even to the point of recommending that you keep your horses, should that course seem best in the light of all the facts.

It will cost you nothing to get the honest judgment of our practical transportation men as to the motor truck equipment that will serve you best. Outline what you would like to accomplish and we will have a representative advise with you personally, or write you fully as you prefer.

DEALERS: Before you decide what motor truck you will handle send for our book, "Introducing the New Member."

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Announcing the New Sheldon 1500 lb. Worm Gear Driven Axle

SHELDON

WORM GEAR AXLES

Above is a picture of the New Sheldon Worm Gear Driven Axle, suitable for a truck of 1500 pounds capacity.

This axle differs from the other models practically in size and capacity only. It follows the same general features of construction and shows the same remarkable efficiency in operation.

Like the larger models, it is designed solely with the view of giving maximum service at minimum cost—rather than to be sold at a price or for the purpose of selling bearings.

It is of the semi-floating type with the loads, both radial and thrust, on the worm and gear taken by ball bearings.

The bringing out of this smaller size worm gear axle now, enables users of light delivery cars and trucks to avail themselves of the exceptional service offered by the Sheldon Company.

Here is an axle that by tests of every conceivable nature has shown from 94 to 97% of power effort delivered to the rear wheels. An axle so sturdy in design and so rugged in construction as to withstand successfully the most severe sort of use and abuse. An axle in which there are no adjustments, because adjustments are never necessary.

Note the clean-cut appearance of the finished product—and note also that there is ample clearance provided for the use of skid chains.

Remember, that in addition to worm gear axles, the Sheldon Axle and Spring Company also specializes in the manufacture of front axles, springs and brake and radius rod equipments.

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This Truck Tire Wins on the Cost Book

These 1915 Goodyear S-V tires—pressed onto the wheel—now solve the truck tire problems that have baffled all makers.

Goodyear experts worked 8 years in achieving this triumph; and their research costs us $100,000 yearly.

They built 29 types of truck tires and designed 74 separate tire structures of this one type alone. Then 2,100 test tires were built and run.

On each we kept a careful record of cost and performance. And truck owners, too, tested these tires by the side of others under every condition.

All these records conclusively prove that this is today's final truck tire—the tire men have sought from the first.

Thus we did not attempt to make this claim until S-V supremacy was fully established. Now, for the first time, we widely advertise Truck Tires—though we have long been the world's foremost makers of tires for pleasure cars.

Cut Cost 5 Ways

Note these definite economies that Goodyear S-V Truck Tires bring—

Reduce Tire Mile Cost—by giving 10% more available tread rubber.

Reduce Cost of Mounting Tires 75% to 80%—by ending all preliminary work on wheels and expenditures for metal fastenings.

Save Cost of Carrying Excess Weight—by abolishing metal bands, flanges, wedges and bolts on all four wheels. (These weigh 225 pounds on the usual 3½ ton truck.)

Reduce Depreciation—by correct cushioning; both the truck and load are saved from racking grind.

Save Power—by means of the Goodyear tire design and compound that remove undue tractive friction.

Now note how 1915 Goodyear S-V tires also end costly "lay-ups" that come from tire troubles—

GOODYEAR
AKRON, OHIO
S-V Truck Tires

Keep Trucks Running

Every minute a truck is moving means money. Wrong tires cause costly "lay-ups" for adjustments, repairs and renewals.

Goodyear S-V tires never do that. They are pressed on in 5 or 10 minutes. No tinkering to make the wheels conform—no boring bolt holes. Metal wedges, bands, bolts and flanges are all discarded.

These tires cannot creep. For the pressure at which they're applied is many times greater than any stress or strain that you could give tires in actual use. And hundreds have run them thousands of miles.

The soft rubber tread, hard rubber backing and steel channel base are all welded into an inseparable unit—a process discovered by Goodyear.

See What Users Say

Write us for particulars—you owe this to your business because you are losing dollars every day you run wrong tires. Let us send you facts, figures and letters from truck owners who have tested these tires and compared results. Address today

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Desk 94, Akron, Ohio
Makers of Goodyear Automobile Tires
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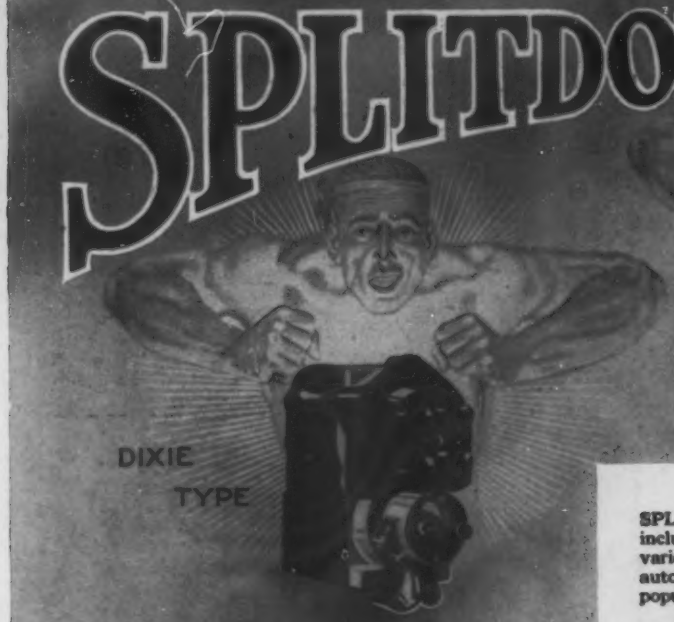
SPLITDORF



SPLITDORF IGNITION devices for the 1915 season include several new types of magnetos of the high-tension variety. These have been designed to meet the clamor of automobile engineers for even more effective units for the popular demand.

Model EU4-2 is a big brother to the highly successful model EU4, being more powerful with its double magnets, and made for 4-cylinder motors developing as high as 40 horsepower. As standard equipment on 1915 ***Overland*** cars, among other makes of automobiles, the efficiency of the EU4-2 is "hall-marked" in view of the severe tests to which many thousands have been subjected.

Two new types of high-tension magnetos, constructed particularly for easy starting without the use of battery, auxiliary coils or any external devices, are the **DIXIE** and the **CUNNINGHAM.**

The **DIXIE TYPE** is distinctly ***new*** and contains many interesting and valuable features — platinum points external to the main breaker-box — no wire on any of the revolving parts — field coil housed in the arch of the magneto — with timing lever at retard or advance the spark is of the same strength for any given speed — minimum loss of energy, etc.

In the construction of the **CUNNINGHAM,** there is practically no difference in the strength of the spark when the break is in advanced or retarded position, the speed remaining the same. By its construction an advance of 70° is obtained, which is essential for long-stroke slow-speed 6-cylinder engines.

Operating slower than any engine, will turn over on its own power and well below the limit for cranking speed, an equipment of either the **DIXIE TYPE** or the **CUNNINGHAM,** overcomes every excuse for having batteries around the car for ignition purposes. All that is necessary with either, is a simple switch for shorting the magneto when stopping.

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NEWARK, N. J.

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The length of time the paste composition will stay in the plates, determines the useful battery life; yet to secure high capacity most battery makers must use a composition too soft to resist the jolting and vibration of service.

The only battery plate that will stand the test of **time** is the one filled with a **hard** composition, and only the Gould Storage Battery Co. has successfully produced such a plate capable also of **high electrical output.** With Gould construction, full electrical capacity is developed by the electrolyte acting on only the plate surfaces while the core remains hard, dense and gritty, instead of being weakened clear through as with soft composition.

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It is your protection against incompetency, indifference and petty deceit on the part of your drivers.

It is an able investigator which shows the leaks in your delivery system and where change or improvement is needed.

It is an invaluable assistant to your auditing force in determining whether or not your delivery system is profitable and, if not, what must be done to make it so.

It's a big contract for a little instrument, but the Veeder is equal to it. It tells the exact truth about your mileage, and it cannot be made to tell anything but the truth and the whole truth. Its price is as nothing compared with the good you receive.

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WHY BUY ABROAD?

ABSOLUTE INTERCHANGEABILITY
MORE SILENT THAN THE "MOST SILENT"
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SUBMIT YOUR ENGINEERING PROBLEMS. WE ARE IN POSITION TO WORK THEM OUT TO YOUR ENTIRE SATISFACTION. NEW CATALOG READY FOR MAILING

THE FAFNIR BEARING COMPANY, NEW BRITAIN, CONN.

BUDA MOTOR

"The part that sells the truck"

has taken contracts away from competitors at higher prices, at lower prices, at equal prices.

Because, on scientific **laboratory** tests, on **factory** tests, on practical **road** tests, on the test of the **sales floor,** and on the greatest test of all—long years of **use**—BUDA Motor shows the good qualities that only the best can have.

See the latest Budas at the Automobile Shows

THE BUDA COMPANY

FACTORY, HARVEY, ILL., (Chicago Suburb)

Address all correspondence to our **FACTORY REPRESENTATIVES**

BRANDENBURG & COMPANY

NEW YORK: January 2—9, Space C-77, Third Floor, Grand Central Palace

CHICAGO: January 23—30, Space 34, Gallery, Coliseum

1108 S. MICHIGAN AVE., CHICAGO — 1311 DIME BANK BLDG., DETROIT — 57TH & BROADWAY, NEW YORK CITY

CULLMAN SPROCKETS and Differentials

in stock and to order.

Send for catalog and let us quote you on your requirements.

CULLMAN WHEEL COMPANY, CHICAGO

1351 GREENWOOD TERRACE

THE WALKER VEHICLE COMPANY

has purchased the factory and business of the Chicago Electric Motor Car Company and will continue the manufacture and sale of

CHICAGO ELECTRICS

This transaction was completed too late to obtain desirable space in the Annual National Automobile Show, to be given in Chicago, January 23rd to 30th, 1915. For that reason we will exhibit

The Complete Line of 1915 Chicago Electric Models

The Latest Model Walker Electric Trucks

at our General Sales Rooms

2700 Michigan Avenue, Chicago

Conveniently located but 10 minutes ride from "The Coliseum"

This exhibit will continue throughout the Automobile Show week. This Company will have an office with representatives present, at the Show, to be found in the Commercial Vehicle Headquarters.

This complete line of electric cars, passenger and commercial, represents the highest known standards of electric car construction.

This line offers, without question the most desirable opportunities to wide-awake live dealers. We cordially invite you to visit our exhibit, where much of interest awaits you.

Allotment of dealers' territories will be made at this time for the coming year.

THE WALKER VEHICLE COMPANY

Sales Rooms 2700 Michigan Ave. — Factory 531-545 W. 39th St.

CHICAGO

Wisconsin

CONSISTENT

MOTORS

No type of motor, **unless specially built**, can withstand the continuous and grueling service of the motor truck.

The commercial car is at work **all** the time—in many cases day and night—and must, therefore, have a **consistent, dependable** and **durable** power plant.

The **Wisconsin** is specially **designed** and **built for motor truck service**—and judging from its continued popularity and ever-increasing demand by truck makers, users and dealers, it may be justly termed—

"The Consistent Truck Motor"

Wisconsin Type A—4¼" x 5½"

We invite inquiries from truck and tractor makers, who require the utmost in power and who build a truck in which is embodied the best obtainable parts and units.

Our new factory, of steel and concrete, covers over 90,000 square feet of floor space and it is devoted exclusively to the production of Wisconsin Motors.

Send for catalog, illustrating and describing the most complete line of gasoline motors in America.

Wisconsin Motor Mfg. Company

Milwaukee, Wisconsin, U. S. A.

BESSEMER TRUCK

Illustration shows Model "C" which is equipped with either pneumatic or solid tires. There is more real sturdiness built into this than in any other one-ton truck on the market.

Three Models

MODEL C	MODEL A	MODEL D
1 Ton Capacity	1½ to 2 Ton Capacity	1½ to 2 Ton Capacity Worm Drive
25 H. P.—$1250	30 H. P.—$1800	30 H. P.—$2300

DEALERS: Write us about the special proposition we have for you. The Bessemer line enables you to handle every truck requirement.

BESSEMER MOTOR TRUCK CO.
GROVE CITY, PA.

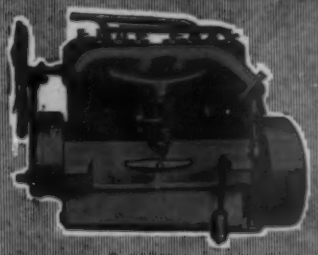
YOU wouldn't expect a race horse to do draft horse work. Then why expect satisfactory Truck service with a pleasure-car motor?

Truck work requires a motor with a capacity for continuous hard work. That is efficiency — and is exactly what you get in the Waukesha Long Stroke Truck Motor. It's a "make good" motor that gives the truck manufacturer full confidence that his truck will do all he claims.

Strength — long wear — economy of fuel — the ability to work under all conditions — those are what you get in every

WAUKESHA

4¼"×6¼" Long Stroke Truck Motor



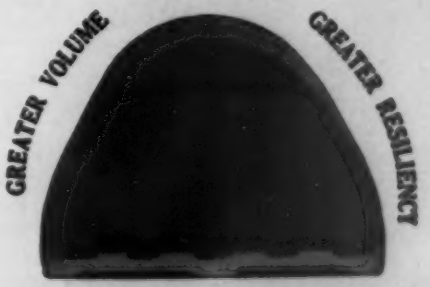
Waukesha Motor. The crankshaft has a tensile strength of 70 tons. The bearings have three times the wearing quality of ordinary bearings. Let us prove the Waukesha Motor's supremacy. Ask us in the next outgoing mail.

WAUKESHA MOTOR CO. Dept. A. WAUKESHA, WIS.

McGRAW SOLID TIRES

Guaranteed for 10,000 Miles

20% MORE RUBBER 40% MORE SERVICE
00% MORE COST



Pressed-on Type. Endless Steel Base.
Applied by Means of Hydraulic Pressure.
Makes Wheel and Tire One Inseparable Unit.

Your dealer can supply you

The McGraw Tire & Rubber Co.
EAST PALESTINE, OHIO

McGramm's Trucks

appeal to the man who has had experience in the use of motor trucks.

To him their quality points, the individual clutch transmission, guaranteed springs, self-starter, etc., mean a definite saving in operating costs.

The full line, 1 to 6 tons, with all its features, is described in our complete catalog, which will be sent you on request.

THE GRAMM-BERNSTEIN COMPANY
Dept. 1 LIMA, OHIO, U. S. A.

Facts That Speak Volumes

The tremendously increased efficiency of motor trucks over horse-and-wagon equipment, and the rapidity with which shrewd business men are changing over to the truck, is seen in these figures: Three years ago May 1 there were 700 trucks in use in Chicago—today there are over 4200.

By far the greater part of this increase consists of light draft trucks that get about swiftly with medium loads. Seven out of every ten average business men can make good use of and increase their profits with a light truck, provided they buy wisely and carefully.

INTERNATIONAL MOTOR TRUCKS

cover this country in greater numbers than any other truck on the market. That is the big fact. Shrewd buyers have demonstrated by their choice in the last eight years that the International is the most profitable economical light truck made.

The truck that has proved best for so many business men is probably the one it will pay you to buy. At least, it deserves consideration. Send for a readable catalogue telling all about it.

International Harvester Company of America
(Incorporated)
182 Harvester Building Chicago U S A

Spicer Universal Joints

Universally Accepted as the Most Dependable Flexible Connection Known to Motor Car Practice

Oil-Tight Dust-Proof

PARTS INTERCHANGEABLE

Spicer Manufacturing Company
Plainfield, N. J.

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Foreign: Benjamin Whittaker, 31 State Street, New York

GEARS

GEARS GEARS

Bevels Mitres Worms
Spurs Spirals Racks
Sprockets

We produce in quantities to specification cut and planed Gears and Pinions of all descriptions. As a source of supply in connection with *Gears* and *Gear Cutting*, we are considered an asset by many of the best interests. They buy from us year after year, because these advantages are afforded:

(1) *Unexcelled facilities.*
(2) *The highest standard of workmanship.*
(3) *Years of experience as specialists in gearing.*
(4) *A most careful selection of materials.*
(5) *Particular attention to deliveries.*

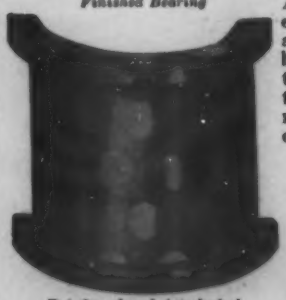
THE VAN DORN & DUTTON CO.
Gear Specialists
CLEVELAND (Sixth City)

GEARS

RYERSON REINFORCED
GLYCO PATENTED SKELETON CONSTRUCTION
BEARINGS

for automobile, motor boat, tractor and stationary gas engines and other machinery where a removable and quickly replaceable bearing is desired.

Finished Bearing



Reinforced and interlocked throughout body and flanges —skeleton and Babbitt one homogeneous mass.

A reinforced Babbitt bearing embodying enormous **strength** and **resistance**. A steel or bronze skeleton embedded in the **Babbitt** changes weakness to strength—just what steel reinforcement does to concrete.

Section showing reinforcement

Steel or bronze skeleton, used in combination with whatever Babbitt metal is preferred.

Demand Ryerson Reinforced Bearings in those vital parts of your engine—the connecting rod and main shaft bearing. The whole engine is no stronger than its weakest part. Inferior bearings make an inferior engine.

Joseph T. Ryerson & Son
Iron Steel Machinery
Chicago New York St. Louis

ON THE JOB EVERY DAY

Day in and day out the year round your truck must be ready to do its work and do it at the least possible expense.

Selden Trucks

have invariably given this kind of daily service to their owners because they are built to stand the strain of continuous work. Every working part to the last bolt is larger and stronger than corresponding parts of any other 3000-lb. truck. We invite comparison.

$500 Puts the $2000 Selden Truck into Service

The balance may be paid at the rate of $125 per month. The Selden Sales Plan as indicated above has proven very satisfactory to users and dealers alike. It will pay you to investigate the true merit of the Selden Truck and the plan by which it is sold.

SELDEN TRUCK SALES CO.

412 East Ave.
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GUARANTEED ONE YEAR

HERZ PLUG

The reasons for HERZ PLUG'S superiority to ordinary makes are definite and obvious.

The Insulation is DOUBLE STONE. The electrodes are PLATINUM-ALLOY. There are FOUR SPARKING POINTS. HERZ PLUG is SELF-CLEANING. It is GUARANTEED A FULL YEAR.

Price, $1.50. Order from your dealer or

HERZ & CO., 245 W. 55th St. (near Broadway), New York

CANDLER TRUCK RADIATORS

Thoroughly Reinforced

Unusual Strength—High Efficiency

The Candler Special Truck Radiator is the strongest construction on the market to-day. It is highly adapted to truck use, by virtue of its efficiency, strength and durability, non-leakable and non-freezable features as well as its ease of repair.

We invite correspondence from those interested in a Practical and Serviceable Truck Radiator.

CANDLER RADIATOR COMPANY
DETROIT, MICH.

Adams Trucks "Deliver the Goods"

1, 1½ and 2 TON

CONTINENTAL MOTORS EXCLUSIVELY

TIMKEN AXLES AND BEARINGS THROUGHOUT

BODIES BUILT FOR ANY TRADE

PRINTED MATTER
SENT ON REQUEST

AGENCY PROPOSITION TO RESPONSIBLE DEALERS

THE ADAMS BROS. COMPANY
FINDLAY, OHIO, U. S. A.

FIRST AMERICAN TRUCK MANUFACTURERS TO USE FRENCH TYPE HOOD, WITH RADIATOR AT REAR OF MOTOR

It is More Important to Save Time Than to Save Gasoline.

You wouldn't permit your truck drivers to waste gasoline, why make them waste time when tire changes are necessary?

United States Motor Truck Tires

DEMOUNTABLE

United States Motor Truck Tires may be changed either in your own garage or on the road. This saves time, and every minute that a truck is out of service costs money.

United States Tire Company
Broadway at 58th Street
New York City

Which Truck Is Best of the Famous Big Four?

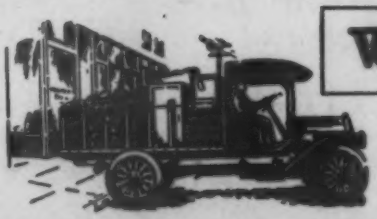
Experienced buyers of motor trucks now choose between four great makes. Each of the four is backed by millions. All are in the business to stay. Among them competition is keen. Almost daily, keenly competitive tests between these four great makes of trucks are establishing which is the best. For all are in use by the largest corporations—who use trucks by the dozen.

In pulling power the Velie Truck, the only one of the big four unadvertised until now, proves that a more powerful, slower running motor will in competitive tests out-pull and out-wear all high-speed, small-powered motors.

In three-ton trucks all four makes have 5 or 6 inch frames—channel shaped, or I-beam. But the Velie in addition to having a 6-inch I-beam frame has a 4-inch sub-frame. And in heavy hauling this extra sub-frame proves its wonderful worth.

Experienced buyers can tell by comparison of specifications why it is that the Velie is winning the fiercely competitive tests between the four best makes of trucks.

Any Velie agent has these truck contest results on file—they are convincing—ask to see them.



Velie

Velie Motor Vehicle Company - Moline, Ill.

Pierce-Arrow Motor Truck Wins Against Time Forfeit of $300 a day

When Pierce-Arrow Truck No. 184 delivered 290 tons of sand in 10 hours on a round trip haul of 1½ miles it settled once and for all the assertion that contractors cannot profitably use motor trucks on short hauls. Employed by the McKelvy-Hine Construction Company, of Youngstown, Ohio, on a railroad job, working against a time forfeit of $250 to $300 a day, this truck delivered an average of 225 tons daily for 125 working days.

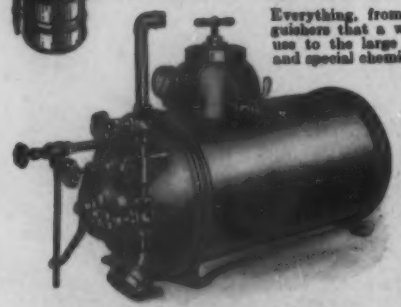
The cost of operating the truck was $15.50 per day, making the average cost of delivery 6½ cents per ton. McKelvy-Hine's Superintendent is authority for the statement that the truck did the work of 14 horses, 7 drivers and 7 two-yard wagons, which would have cost $42.00 a day, or 18¼ cents per ton, delivered. The net saving on the job was, therefore, $26.50 per day, to say nothing of the fact that the truck handled the material so quickly that no labor was ever idle.

THE WORM GEAR

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

The Pierce-Arrow Motor Car Co.
BUFFALO, NEW YORK

DEPENDABLE Chemical Fire-Fighting APPARATUS



Everything, from the hand extinguishers that a woman or child can use to the large Chemical Engines and special chemical tanks for Fire Department service.

Into each is put material and workmanship that cannot be excelled. Designs are shown by actual use to be beyond improvement.

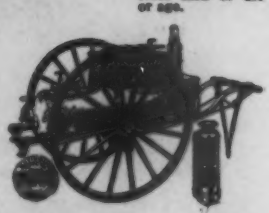
Result: Perfect and immediate action when needed, no deterioration from lack of use or age.

All Our Tanks Are Made of Copper

The name "CHILDS" stands for perfection.

Chemical Tanks for Fire Department or other service made to order.

Write for our Complete Catalogue and interesting talk on Fire Apparatus.



O. J. CHILDS CO., Utica, N. Y.
MANUFACTURERS FIRE APPARATUS

Pyrene

FIRE EXTINGUISHERS

A SCIENTIFIC agent which extinguishes every kind of incipient fire—gasoline, and electric, as well as the ordinary kind.

"The Most Efficient Fire Extinguisher Known"

At Leading Dealers Everywhere

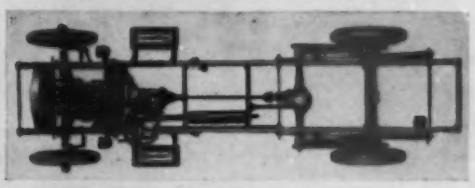
Write for Literature

The Pyrene Mfg. Co.
1358 Broadway New York, N. Y.

Stegeman

2nd Argument:

"Is Simplicity Important?"



Besides using the "World's Best Units"—there is a feature in the STEGEMAN which is quite as important as the units themselves and that is, in short, "Simplicity."

Study the engraving above and you'll agree that the "STEGEMAN" is the most simply designed chassis of any you have ever seen.

Our Policy For Five Years

We started out 5 years ago with this idea of "Simplicity" in mind, believing that it was *one* of the ways to eliminate a great many of the User's troubles.

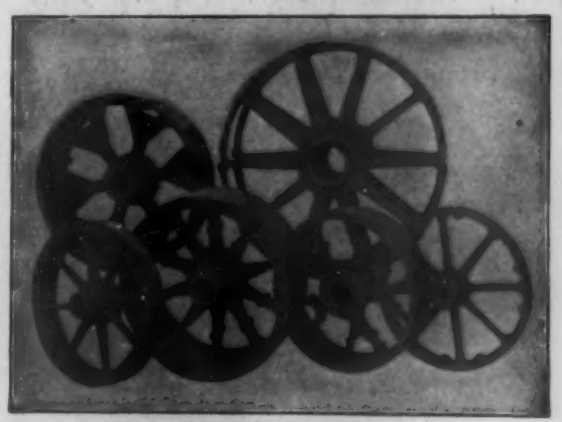
We have succeeded. We have a host of Perfectly Satisfied Users. This, coupled with the fact that we have kept to our original design (while others have continually changed), proves that it has won out and that *Simplicity is necessary to economical motor truck operation.*

Our bulletins and other truck data should be on your desk for ready reference. Yor can have them for the asking.

SIZES: ¾, 1½, 3½, 3½, 5 ton

STEGEMAN MOTOR CAR CO.
MILWAUKEE, WIS.

Cast Steel Wheels for Trucks



Any size or form to your specifications
35% saving on tires — 100% over wooden wheels

Our guarantee back of our wheels
5,000 wheels to date — no failures

Especially adapted for Army Service

Delivery in 6 days time after receiving order. Capacity 60 wheels per day

SEE OUR EXHIBIT AT THE CHICAGO SHOW

The West Steel Casting Co. CLEVELAND OHIO
Producers of Automobile Steel Castings

EVERY Automobile Accessory sold under this emblem is a product of proven excellence, backed by the Johns-Manville Guarantee for satisfaction, and their unrivalled facilities for service in every important city of North America.

Johns-Manville Accessories

Jones Speedometer	J-M Dry Batteries
Long Horn	J-M Mobilite Electric Lamps
Carter Carburetor	J-M Automobile Tape
Johns-Manville Shock Absorber	J-M Fire Extinguisher
J-M Lens (Non-Blinding)	J-M Tirenew
J-M Non-Burn Brake Lining	J-M Narco Tire and Top Savers
J-M (Mezger) Soot-Proof Spark Plug	G-P Muffler Cut-Out
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THE CANADIAN H. W. JOHNS-MANVILLE COMPANY, Ltd.
Toronto Montreal Winnipeg Vancouver

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PLAIN COMPRESSION
(Patented)

Empress

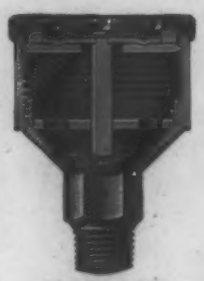
BRASS AND STEEL

GREASE AND OIL CUPS

WE MANUFACTURE

a full line of Plain, Leather Packed, Ratchet, Marine, Spring Compression, and many other styles of Grease Cups.

Our line of Oil Cups is equally satisfactory and complete.



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(Patented)

Catalogue on Application

Bowen Manufacturing Co.
AUBURN, N. Y.

Power for Every Purpose

Maximum Power, Speed and Endurance with Minimum Cost for upkeep and operation. Extreme Simplicity with Unequaled Efficiency. Perfect Balance. Long Life. You get all these advantages when you equip your commercial cars or pleasure cars with

THE RUTENBER MOTOR

Fours and Sixes suited to the requirements of all kinds of motor-driven vehicles. Standard or Unit Types. All L-Head, Four Cycle. The Rutenber Motor practically guarantees a ready sale for the car or truck that carries it.

We invite manufacturers to investigate our motors and our facilities for giving service. Literature on request.

The Rutenber Motor Company
Marion - - Indiana

ROWE MOTOR TRUCKS

are used in every line of business and in every case have proved the most economical means of hauling.

A Rowe Truck will save you money in transporting your merchandise.

The Rowe Truck is guaranteed to give

Continuous Economical Operation

Worm or chain drive. One to five tons capacity

Rowe Motor Manufacturing Co.
Downingtown, Pa.

ESTABLISHED 1909 INCORPORATED 1914

SIX YEARS OF SUCCESS

The United States Motor Truck Co.

Cincinnati, Ohio

OFFERS A FINE OPPORTUNITY TO DEALERS

GET OUR PROPOSITION

Made in
2, 2½, 3 and 4 ton
Capacity

THE correctness of its construction combined with best quality materials and right prices, make the U. S. a splendid value for buyers and a good proposition for dealers.

SPECIFICATIONS AND PRICES ON REQUEST

GEAR BRONZES

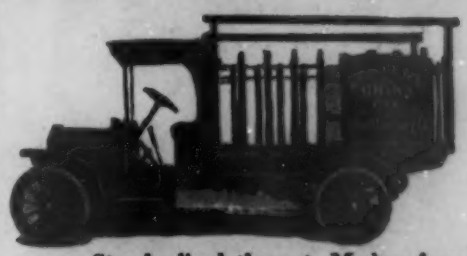
CRAMP

BEARING METALS

The best motor cars and trucks, those famed for their sturdiness and long service, boast the **CRAMP METALS.** The world's greatest battleships have spread the fame of **CRAMP METALS** world wide. The high standard of precision, accuracy and quality set in these battleships is not approached in any other engineering feats. Everywhere and every day **CRAMP METALS** become a part of some great commercial enterprise, simply because their quality is known. Why experiment? Specify—

"CRAMP BEARING METALS AND GEAR BRONZES"

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, U. S. A.



DEALERS, ATTENTION!

MODERN

THE BOWLING GREEN MOTOR CAR COMPANY

TRUCKS FOR 1915

Standardized thruout, Modern from radiator to tail lamp, built in chain and worm-drive models. Just the truck to get the business in your territory. *Live dealers should write for catalog.*

THE BOWLING GREEN MOTOR TRUCK CO., Bowling Green, Ohio

The

NEVER-SKID

FOR MOTOR TRUCKS

PREVENTS SKIDDING ***GIVES TRACTION***

Used by U. S. Government,
Brewers and Motor Truck Manufacturers throughout the U. S. and Canada

NEVER-SKID MANUFACTURING COMPANY
798 Tenth Avenue, New York

FRAMES

THE PARISH & BINGHAM CO.
CLEVELAND, OHIO

Our Entire Engineering Force is at Your Disposal

A Properly Cooled Motor Is Most Efficient

LONG Cooling Systems

Many of the highest grade motor trucks include Long Cooling Systems in their *regular* equipment because they assure maximum efficiency of the motor at all times under varying conditions. Perfect radiation is guaranteed.

Long Cooling Systems are built *to order*. The requirements of each motor are studied and a cooling system designed that perfectly solves the radiation problem.

Guaranteed to cool properly the motors for which they are built. Guaranteed to be free from imperfection in Design, Material and Workmanship.

Send for catalogue showing all the types of cooling systems we make, Cellular, Flat Tube Honeycomb, Spiral Tube, Fin and Tube.

We are specialists in the manufacture of cooling systems for every type of motor car, truck or tractor.

LONG Mfg. Co.

Detroit, Mich.

Pioneer Makers of Gasoline Engine Cooling Systems

VIM LIGHT DELIVERY

The Car that Proved a Real Solution of Delivery Problems

Price, $635—Capacity, 1000 lbs.

A real commercial car—strong, rugged, durable—of oversize parts and high quality, at a price which makes it available for merchants of every character. Scores of dealers are finding it the money maker of their careers—it may be such for you. Write for information.

The Touraine Mfg. Company,

Main Office and Factory: Broad and Huntingdon Sts., Philadelphia, Pa.

Plant where Vim Cars are made

Capacity doubled to meet demand of 60 days

PACKARD TRUCKS CUT COSTS AND INCREASE YOUR BUSINESS

EXPRESS and transfer business demands a motor truck that will adapt itself to a wide range of hauling conditions.

In eighty-five American cities, Packard trucks have proved their fitness for this exacting service.

A transferman's profits increase directly with his ability to take advantage of his opportunities. To him time is money lost or earned.

Today more than ever before the Packard is a profit builder. Horseflesh and horse maintenance continue to advance in cost. Packard trucks reduce your costs and at the same time expand the radius of your service.

One hundred and fifty-five successful express and transfer firms are operating three hundred and seventy-two Packard motor trucks.

ASK THE MAN WHO OWNS ONE

PACKARD MOTOR CAR COMPANY
DETROIT

Licensed Under Kardo Patents — Lincoln Highway Contributor

ROSS STEERING and DIFFERENTIAL GEARS

are standard on good motor truck construction

WRITE FOR CATALOG

ROSS GEAR & TOOL CO.

790 Heath St. :: Lafayette, Ind.

STEEL WHEELS for MOTOR TRUCKS

BESCO Steel Wheels on the Jeffery Quad

It is a significant fact that the **Jeffery Quad**, which, after very severe tests, has been ordered and repeatedly reordered by the United States Government, and which has been bought by the hundreds by the various European War Departments, has BESCO STEEL WHEELS.

The service these trucks are called upon to perform for the various armies of the world is so severe and the conditions under which they operate are so difficult that ordinary wheels are unequal to the task. This makes it imperative that the Quad be equipped with the strongest, most durable wheels made. After careful tests, BESCO WHEELS were selected as being the best wheel equipment for this famous truck.

While commercial trucks are not designed for war purposes they often are called upon to perform service that is almost as severe. To successfully carry their load under such adverse conditions requires the strongest type of wheels. Investigation will convince you that BESCO WHEELS meet these requirements better than any other.

Among the advantages of BESCO WHEELS can be mentioned the following: They are stronger than wood, less liable to accidents, unaffected by excessive strain, are lighter in weight, are unaffected by climate, absolutely true, are neater, cleaner and faster, and last indefinitely. Let us send you complete data and illustrated catalog covering these various points.

Buchanan Electric Steel Company, Buchanan, Michigan

Originators and Designers of Cast-Steel Disc Wheels for Motor Vehicles

Electric Furnace Castings

Originators and Designers of Double-Disc Pressed-Steel Wheels

Russel Axles

Internal Gear Drive Axle

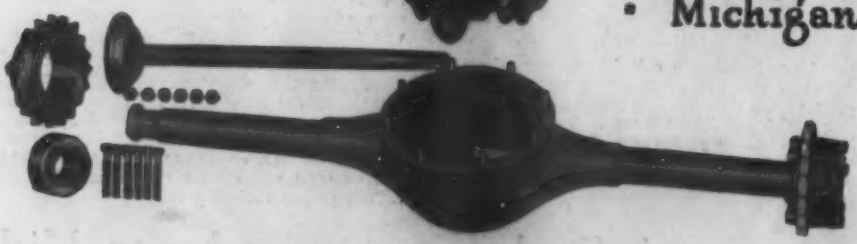
Differential Gears

Front and Rear Axles
for Light Touring Cars

Jack Shafts
for 1 and 1½ ton Trucks

Internal Gear Drive Axles
for 1,000 lbs. and 1 ton Trucks

RUSSEL MOTOR AXLE COMPANY
North Detroit
• Michigan. •



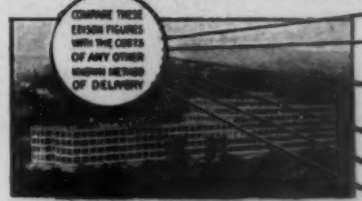
Full Floating Jack Shafts for 1½ ton trucks

When Writing, Please Say—"Saw Your Ad. in the C C J"

I CLAIMED that the **New Alkaline Storage Battery** would make the Electric Vehicle the cheapest means of Street Transportation, but I had only my private tests to satisfy me. Today thousands of Edison Batteries in thousands of Trucks and Delivery Wagons are making Operating Records that are easily investigated by all. After the four or five years of hard service that many of these vehicles have had, is it possible to deny that my claim is proved?

Thomas A. Edison

HERE IS ONE RECORD—A REPORT—ON 22 FIVE-YEAR-OLD EDISON BATTERIES



The Edison Storage Battery Plant at Orange, N. J., as an electric by the day at the Edison Phonograph Works on December 5th

Write for Bulletins on the use of **Edison Batteries** for Lighting Country Houses, Ignition and Lighting of Gasoline Cars, Yacht Lighting, Railway Train Lighting and Signaling, Telephone, Telegraph and Wireless *and High-priced or Low-priced Passenger Electrics.*

Edison Storage Battery Company
Orange, New Jersey

Manufacturers of { New York, Chicago, Boston, Cleveland, Washington, San Francisco, Los Angeles, Portland, Oregon, Seattle

ADAMS EXPRESS COMPANY

342 WEST 47th STREET

MOTOR VEHICLE DEPARTMENT
GEORGE STEVENS
SUPERINTENDENT

New York, December 7th 1914

Edison Storage Battery Company,
Orange, N. J.

Attention of
Mr. A. Eschmann,
V.P.& Genl Mngr.

Gentlemen:-

Thank you for consenting to extend from five to six years the conditions of your guarantee regarding renewal of positive plates.

The average operating cost per battery per month of the twenty-two trucks at Indianapolis, equipped with Edison Batteries in November 1909 and averaging about 680 miles per month, is as follows:-

YEAR	BATTERY MAINTENANCE (Refilling, new solution, watering, cleaning, all repairs, inspection, etc.)		CURRENT (Purchased by meter)	TOTAL
	Material	Labor		
1910	$3.47	$4.10	$10.08	$17.62
1911	3.41	4.10	8.93	16.44
1912	3.41	4.10	9.90	17.41
1913	2.88	4.10	8.17	15.15
1914(to Oct.31)	3.11	4.10	9.80	16.17

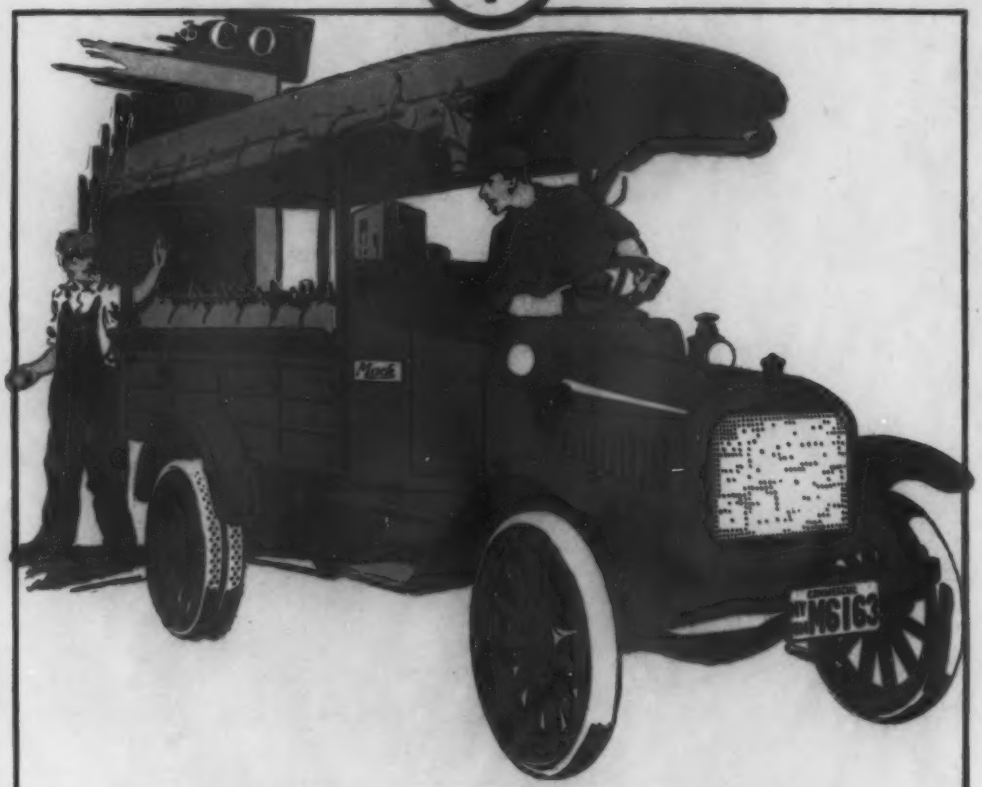
The average total operating cost per battery per month has, therefore, been $16.86 for a period of five years. At this time the average mileage per truck was about 80,000, which reduces the operating cost to 2.08¢ per mile. The batteries are still in service.

Yours very truly,

Superintendent

GS:HMV

When Writing, Please Say—"Saw Your Ad. in the C C J"



MACK

THE WAR AND YOU

THE great war has shown up strikingly the economy and efficiency of the gasoline motor truck under all conditions and circumstances.

It has given the motor truck an impetus which is bound to help the truck business in the United States as will also the extensive exportation of horses to Europe.

The motor truck has proved its value in war; the MACK has proved its high standing among motor trucks. Manufactured for 16 years, the MACK line has steadily advanced in its ability to do the work required of it.

The recent sale to the Fire Department of the City of New York of 20 MACK Trucks in addition to the 53 MACKS already in that service tells its own story. This sale was in keen competition as to specifications and performance.

In this country so far only 2% of the possible market has been sold. The other 98% is *your* field, if you go after it right. We can be of valuable assistance to you. Write for our sales proposition and catalogue.

MACK TRUCKS from 1 ton up to 10 tons

MACK INTERNATIONAL MOTOR COMPANY SAURER
WEST END AVE. & 64TH ST. NEW YORK CITY

Stewart

Hannold Undertaker Philadelphia

Hotel Benson Portland, Ore.

Hudnut Markets Provisions Fall River, Mass.

E. Welch Florist Hartford, Conn.

U. S. Mail Washington, D. C.

Wagner Pastry Company Newark, N. J.

Bell Telephone Company Buffalo, N. Y.

Bowitt-Teller Millinery and Ladies' Wear New York

Stewart Owners Buy More Stewarts

— because Stewart trucks, by paying for themselves in a year, are a good business investment.

— because Stewart trucks stand up under the hardest usage.

— because Stewart trucks mean big profits by making money for owners, saving time and bringing trade.

— because Stewart trucks are designed right; constructed right, and built of the finest materials.

— because Stewart trucks are simple in design and simple to drive.

— because comparisons show that Stewart trucks cost less to operate than any other delivery trucks made.

— because Stewart trucks show an average annual repair expense of only $1.37 per truck.

— because Stewart trucks do the work for which larger trucks were formerly thought necessary.

These are reasons why Stewart owners never go back to other makes of delivery trucks.

These are reasons why among Stewart owners—and they are to be found in 120 cities and 85 lines of business—there is today ***not a single dissatisfied user.***

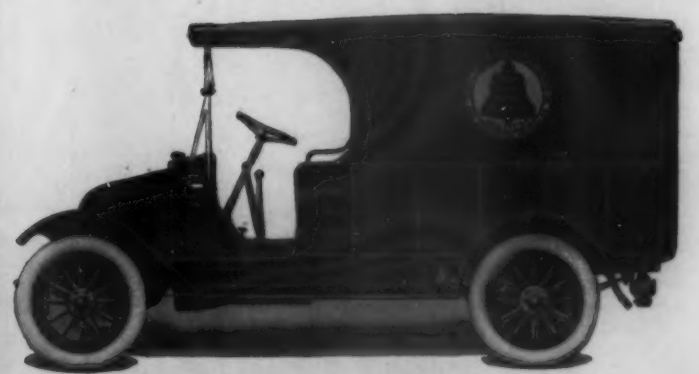
And these are reasons why Stewart owners buy more and more Stewart trucks all the time.

Not only do owners endorse Stewart trucks by first choice and by re-orders. Engineers—mechanical experts of high repute—tell us that Stewart trucks are right. Not one of them has ever pointed to any feature of the Stewart that needs to be improved.

That Stewart trucks make good and win the confidence of owners everywhere is only natural. For Stewart trucks are built by specialists. All our facilities, all our energy, and the experience of an expert organization have been ***concentrated*** for five years on this type of delivery truck.

Write ***today*** for our book, "How Motor Delivery Pays". It contains much information of interest to every business man and every business house with goods to deliver.

Stewart Motor Corporation, Buffalo, N.Y.



Dealers: Ask About Our New Policy

We have a dealership proposition that is unusually liberal. We can assure more prompt deliveries, by reason of increased facilities and larger output. And we do not require dealers to put up a lot of deposit money, nor to contract for a big number of trucks.

Write ***today*** and learn about the Stewart proposition—and why it will be to your advantage to handle the Stewart; providing, of course, your territory is now open.

EISEMANN

Indicative of the determination of the Eisemann Magneto Company to take care of American manufacturers without delay, announcement is made of another increase of the present large factory.

Last Summer, long before hostilities broke out in Europe, an increase of more than a third additional space was arranged for. This has just been occupied with full equipment for manufacturing. But with recent developments even this space was insufficient for us to keep up with growing demands. So we have just started upon an even larger increase of manufacturing space and facilities which we will occupy within a very few weeks.

While some of this demand for Eisemann instruments has been occasioned by war conditions, that have not affected our products, the greatest proportion of it is a natural growth as a result of the realization on the part of car makers, of an unquestioned supremacy of Eisemann products from a standpoint of efficiency, durability and dependability.

Additions to Eisemann Factory

The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

New York 245 W. 55th St. | Indianapolis, Ind. 415-417 N. Capitol Ave. | Detroit, Mich. 802 Woodward Ave

ALLEN BAKER
Pres. & Gen. Mgr.
Federal Truck Company of St. Louis
Federal Distributors

"We are proud to say that we have not one dissatisfied owner." Just think what that sentence means to a dealer in motor trucks. It is the best kind of an endorsement of the Federal, the service that it gives and the service rendered by the Federal Organization.

If you were selling Federalized Transportation you could say the same thing—Federal Dealers all over the world realize that they are selling more than Federal Trucks—they are selling efficient, economical and thoroughly dependable transportation service.

The Federal Company is one of the strongest in the motor truck industry, financially and in quality as well as quantity of production.

If there is any possibility of your going into the business, taking on a truck or changing your line—you owe it to yourself as well as your customers to investigate the Federal.

FEDERAL
MOTOR TRUCK COMPANY
112-120 LEAVITT STREET
DETROIT, MICHIGAN

—Another FEDERAL Endorsement

FEDERAL TRUCK COMPANY
1218 CHESTNUT STREET
MAIN 649 ST. LOUIS, MO. Oct. 17th 1914.

Federal Motor Truck Co.,
Detroit, Mich.
Gentlemen:

Our connection with the Federal Motor Truck Co. has certainly been a pleasure and a profit, in their treatment of this company as well as their treatment of Federal owners. The trucks have done the rest.

We still have trucks #6, 9 & 13 running. These were some of the first Federals manufactured and have been in active service for five years. They are still running in good shape, doing their daily work, and are in almost as good condition and cause their owners as little expense as the new models. We are proud to say that we have not one dissatisfied owner.

Yours very truly,
Federal Truck Co. of St. Louis
By Allen Baker

Sullivan Trucks

Now Sold

Deferred Payment Sales Plan

$400 Cash Will Buy Sullivan $1600 Truck
Balance $100 Per Month

This new sales proposition means to the live dealer many sales with good firms who would not buy on the cash basis.

You do not have to tie your capital up to make these sales.

This truck is built of High-Grade and Standard Parts, such as Buda Motor with Governor, Bosch Ignition, Holley Carburetor, Hartford Clutch and Joints, Covert Transmission and Russel Jackshaft, Sheldon and Liggett Axles with Bower Roller Bearings, Ross Steering Gear, Square Spoke Wheels, and Firestone Tires.

The details in the Design of this truck have been carefully worked out, and with these standard truck parts, it makes a most serviceable and dependable truck.

This combination of Truck and Sales Plan, together with a liberal discount to the Dealer, makes a proposition for Good, Live Dealers, one which will make them a good profit for their efforts in selling it.

Detailed information mailed at once to Dealers interested

SULLIVAN MOTOR TRUCK CO., Rochester, New York

The Greatest Show of All

More impressive than all the exhibits in Shows and salesrooms is that given by

SCHWARZ WHEELS

in carrying their burdens—often excessive in weight—in the everyday work of commerce. The Show exhibits have their place. They enable you to get the theory, see its application, note the construction, observe the quality and workmanship, learn why the best makers use them.

They inform you as to why the Schwarz method of construction is superior and what you can expect from such wheels. But, after all, the point of chief interest to you is—What do they do in service?

That is why the hundreds of SCHWARZ WHEEL-equipped trucks in any large city are the most impressive exhibit of all—it shows how thoroughly, staunchly and capably SCHWARZ WHEELS bear the burden and how superior they are to ordinary wheels.

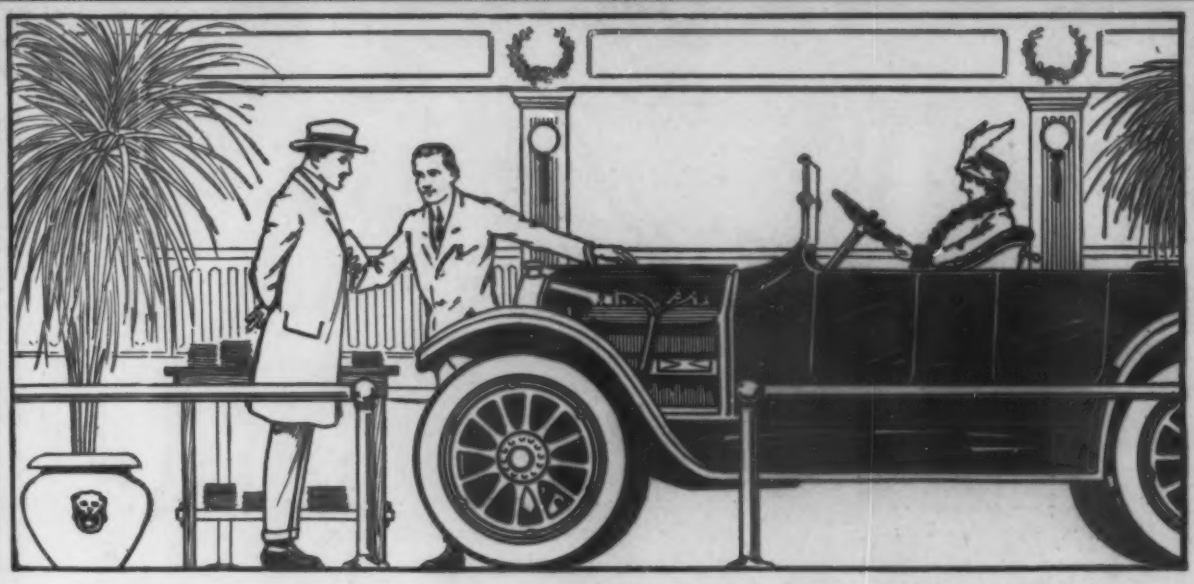
We want you to believe in SCHWARZ WHEELS as most of the leading makers believe in them. To do this you should get our booklet, "Bear the Burden," see our exhibit, interview makers who use them, and then get first-hand testimony from users and from observation as to what they actually do in service.

Do this, and as sure as day follows night you will conclude that your trucks should have SCHWARZ WHEELS, if you want the utmost in strength, safety and service.

The Schwarz Wheel Company

Frankford Philadelphia Pennsylvania

When Writing, Please Say—"Saw Your Ad. in the C C J"



This salesman *knew his car* when he said:

"And as further proof that the entire electrical system is absolutely right, notice the wire we use—it's

Packard

PROTECTED CABLE"

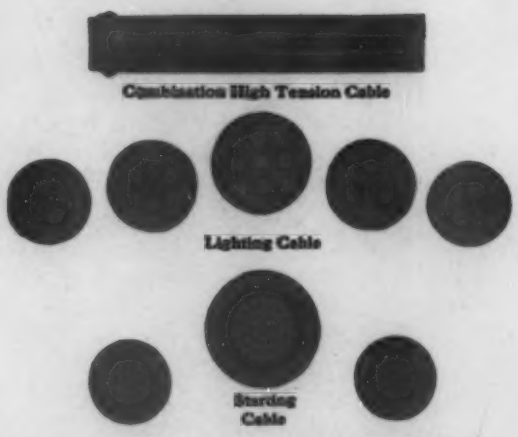
This salesman had the right idea—he was selling *service*, which is a bigger thing than selling a car.

He knew what *real* service is—and the maker of that car knew, as proved by the use of Packard cable.

Service first is a good motto and good business.

Packard cable on a car is a mighty sure sign that the *whole car* is built for service—the one best way to build for sale.

Write for descriptive folder, showing 28 standard styles in actual sizes and natural colors.



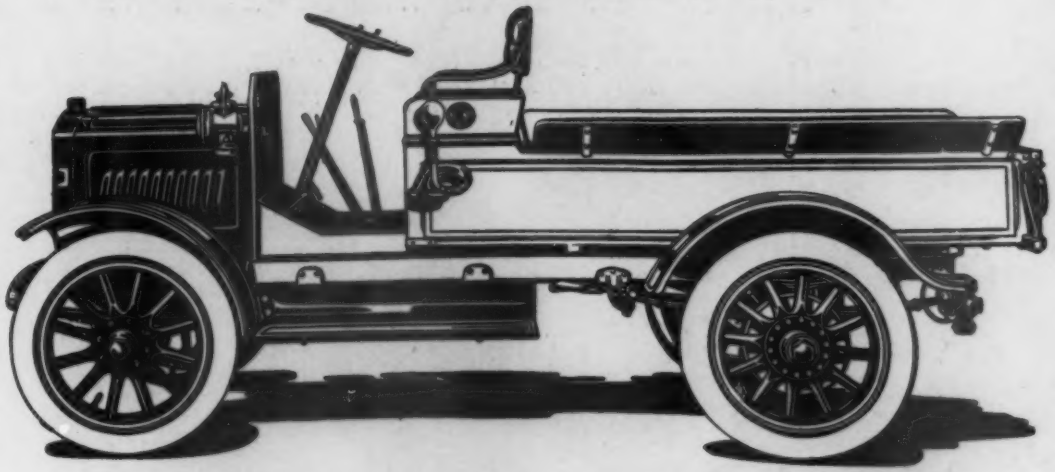
THE PACKARD ELECTRIC CO., Dept H, Warren, Ohio

(107)

ANNOUNCEMENT

1915 Flint Model

2000 Pounds Capacity



Chassis Price, { **$1190 WITH SOLID TIRES**
$1275 PNEUMATIC TIRES

The 1915 Model closely follows the constructional lines which have made the "FLINT" such a phenomenal success in the past, with some minor changes and refinements.

This new model spells "Opportunity" for the dealer who is anxious to get the 2000 lb. business in his locality. It is the lowest priced 2000 lb. truck of its quality on the market, and the greatest value of any of that capacity.

It is a truck of established reputation. Its correct solution of the problems of arranging loading space and its efficiency-producing features of construction, have caused it to earn its way in the service of those who are close figurers of costs.

The producing company is long established, with a reputation for quality to maintain, and production facilities of the highest class. It is financially strong and has both the ability and disposition to back up "FLINT" dealers in every possible way. Your customers are assured of having a truck of proved worth, backed up by a company of unquestioned integrity and stability.

All of these elements are essential to a successful agency. Nowhere else can you secure a truck that offers so much real worth and value for the money as you get with the "FLINT." It is to your interest to secure definite data about the "FLINT" proposition. We'll place all this in your hands upon your request. Write today!

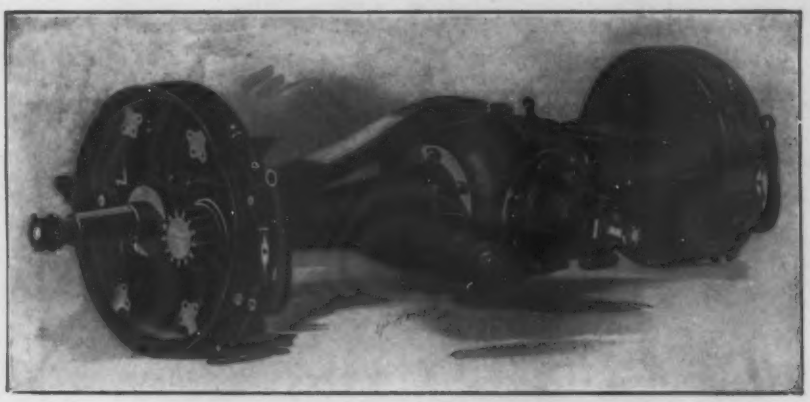
Flint Commercial Car Department

DURANT-DORT CARRIAGE CO. FLINT, MICHIGAN

Celfor Axles

INTERNAL GEAR DRIVE
for Three-Quarter-Ton to Three-Ton Trucks

The attention of designers, engineers and truck makers is invited to this new axle, shown herewith in complete assembly and in cutaway section. It is the result of careful study of drive requirements and prolonged experimentation and testing on the part of our engineers. We offer it as the best drive on the market in its particular field, and one possessing great strength and adaptability without excessive weight.



Among the constructional features please note the following:

The dead rear axle is an I-beam section, enlarged at the center, gradually tapering to spring pads. This eliminates the deflection of the solid axle and holds the live axle in true alignment.

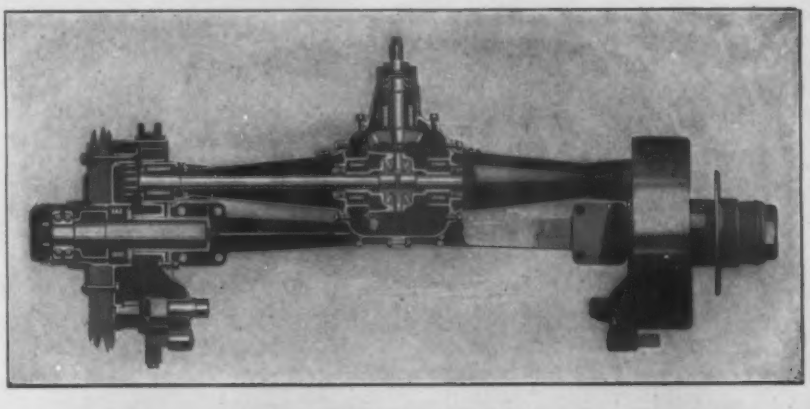
The live axle is a unit in itself, of ribbed tubular construction. It is supported by dead axle at center of I-beam construction and on brake support castings. This forms a strut construction which increases the strength of both members. The wheels are carried on non-adjustable bearings, permitting easy removal or replacement.

Both sets of brakes are large, of wide face, positive in action, long in life. A felt-circumferenced pressed-steel disc excludes dust and broken parts from gear chamber.

The gears are large and made of alloy steel drop-forgings, hardened and with special cut four-pitch teeth. The internal gear always has two teeth in mesh, reducing tooth pressure and allowing graphite lubrication.

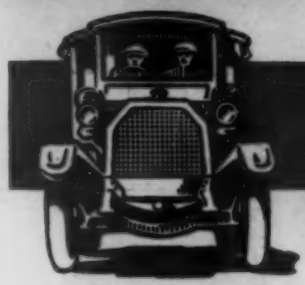
There are no right or left-hand pieces except in the differential.

We will be glad to supply you with complete detailed information upon request.

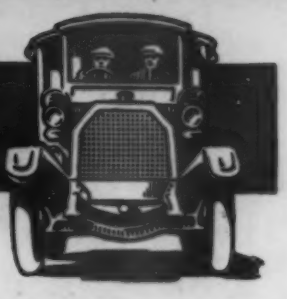


Celfor Tool Company
BUCHANAN, MICHIGAN U.S.A.

Look for the name LEAK-PROOF stamped on the Ring



Depend on Power



More effective and permanently dependable truck service at a lower operating cost is the result of using

TRADE-MARK REGISTERED

MADE IN ALL SIZES

EASILY ADJUSTED

PATENTED

Piston Rings

MADE BY McQUAY-NORRIS MFG. CO.

To protect you from imitations LEAK-PROOF is stamped on the ring—insist

Motor truck profits are only to be obtained by getting down to a proper scientific basis of operating economy. Waste is loss. Every gallon of fuel should produce the last fraction of power it contains and that power should be efficiently applied, for power shortage has to be made up in increased consumption of fuel and oil, more time, more motor wear, until the margin of profit is wiped off.

Put LEAK-PROOF PISTON RINGS in your motor trucks and watch the difference in your cost sheets. They conserve power because they are designed to overcome the defects that allow power loss in all other types of piston rings.

Their sealed vents, equal and sustained bearing, provide perfect compression—their light tension eliminates friction loss—their mechanically correct fit prevents carbon pockets in the grooves, waste of lubricating oil and excessive cylinder wear.

Send for FREE Book, "To Have and to Hold Power"

It tells all about piston rings and why you should equip your motor with LEAK-PROOF. How it will pay you in fuel economy and prolonged motor life.

"Ask the User"

In Use on Over 300,000 Motors

Sold by all up-to-date dealers, garages and repair shops

Manufactured by

McQUAY-NORRIS MANUFACTURING CO., Dep't C St. Louis, Mo.

Canadian Factory—W. H. Banfield & Sons, No. 120 Adelaide Street, West, Toronto

BRANCH OFFICES

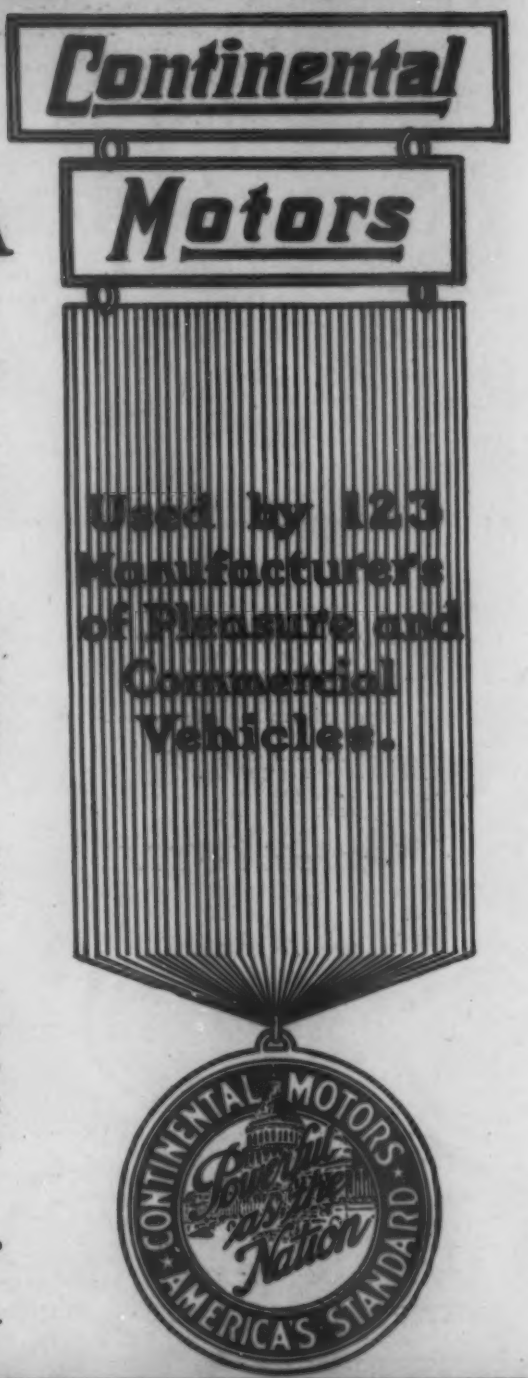
New York—1919-29 Broadway at 64th St.
Pittsburgh—7620 Tioga St.
Kansas City—513 New Nelson Bldg.
Chicago—Suite 718 Michigan Blvd. Bldg., Michigan Ave. and Washington St.
San Francisco—164 Hansford Bldg.
Los Angeles—224 Central Bldg.
Dallas—1509 Commerce St.

There's no leak proof ring but the LEAK-PROOF Ring — insist

When Writing, Please Say—"Saw Your Ad. in the C C J"

1914

A Record Year and a Word of Appreciation



The rewards of organized effort and sincere ideals come slowly, but surely: Continental has been twelve painstaking years in the creating of its world-wide reputation.

Yet when *earned* rewards do come, they come richly. One hundred and twenty-three manufacturers are today building into their product the certainty and the extra guarantee of goodness that Continental has been developing since the earliest days of the automobile industry.

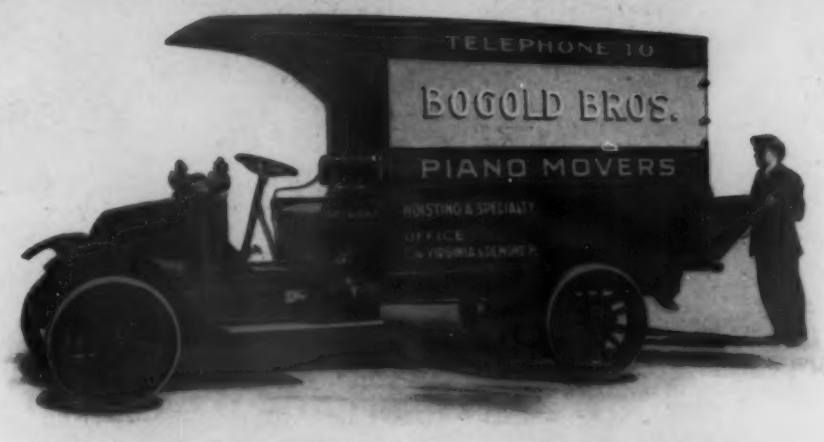
More than eight thousand dealers are also sharing in this success. And a hundred thousand owners are more than Continentally satisfied.

To all—manufacturers, dealers, owners—the Continental Motor Manufacturing Company extends thanks; and the hearty promise of the continuation of Continental co-operation to the fullest measure, for other and equally prosperous years.

Continental Motor Mfg. Co.

Largest Exclusive Motor Builders in the World

Factories: Detroit, Muskegon **DETROIT, MICH.**



Do You Have a Bulky Load or a Heavy One?

There is a size and body capacity possible in Lippard-Stewart Trucks to meet the requirements of all lines of business. Over one hundred different kinds of business are being served by Lippard-Stewart trucks. Over forty of these concerns have sent reorders, after thorough satisfaction with the original truck, and in many cases, after competitive tests with other makes of trucks.

Speed-Endurance-Appearance

You see fleets of Lippard-Stewarts giving silent, speedy, good-looking service in the larger cities and making suburban runs over good roads and bad; making wonderful records on the hilly streets of San Francisco, Pittsburgh and Seattle.

Read the four-page advertisement in the November Commercial Car Journal that tells about the Lippard-Stewart Company, gives a list of representative Lippard-Stewart owners and experiences of several users.

Carstens Packing Co., Seattle, Wash.

A truck that is making a record on the hills of Seattle, Wash. This type and make of truck is also used by Jacob Dold Packing Co., Buffalo, N. Y., Kansas City, Liverpool, Eng.

What the Worm-Drive Saves

Flow of power is continuous and smooth, saving fuel, saving wear and tear of mechanism, saving loss of power; general life of truck is longer; operating expense is less. The great efficiency of Lippard-Stewart Trucks and the low operating expense records they make are due, in a large part, to this successful application of the worm-drive.

Read the Article Beginning Page 11 in the November Issue

Catalog and Complete Information, whether owner or dealer, sent on request only. Please use business letterhead.

Radiator at Dash, Our Dealers' Sign

Lippard-Stewart MOTOR TRUCKS

Lippard-Stewart Motor Car Co.
237 W. Utica St. Buffalo, N. Y.

½ Ton, ¾ Ton, 1 Ton, 1½ Ton, 2 Ton

APELCO

AMMETER

MOTOR AND DYNAMO IN ONE UNIT

AUTOMATIC SWITCH

APELCO electric starting and lighting outfits — both single and double-unit systems — are strong features of the 1915 season. While simplicity has been kept foremost in **APELCO** products, construction in every detail is such as to withstand the most severe test of automobile service.

In combining the motor and dynamo into one unit, as practiced on ***Mitchell, Briscoe*** and other cars, not only compactness is secured, but a design lending itself to an easy application to the automobile engine. Acting as a motor, the machine has sufficient power to ***spin*** the engine at a good rate of speed. As a generator it has capacity to keep the battery fully charged, insuring ample current for starting, lights, ignition, horn, etc.

In the two-unit **APELCO** system, motor and starting switch form the one, and generator and timer distributor the second unit. An important feature embodied in the generator unit is the method in which the generator and the driving bracket are connected. The complete generator can be removed for any care or attention without disturbing the ignition system. The drive from engine is by a combination of spiral gears that insures noiseless running. The starting motor in combination with the starting switch is small and compact, automatic in action and positive in practice.

LIGHTING GENERATOR

The entire self-controlling mechanism of the new **LIGHTING GENERATOR** is contained within its housing, and but one pair of wires need be run from the generator to the battery. The movable element is independent of dashpots, liquids, frictional devices, pivots, oil, grease, graphite, and shocks on the road.

In both single and two-unit **APELCO** systems, the Indicating Automatic Switch is mounted in the circuit between dynamo and battery. Its function is to make connection between these two units when the voltage of the dynamo exceeds that of the battery, as well as break connection when the battery voltage exceeds that of the dynamo.

The **AMMETER** is a new comer, designed particularly for automobile service, and creates special interest by reason of the fact that violent jarring, due to vibrations of the dashboard, cannot affect it as regards accuracy and mechanical stability. Here again reliability and efficiency are the keynotes.

Study our exhibits:

New York Show: Space C, 60-73
Chicago Show: - - Space 59

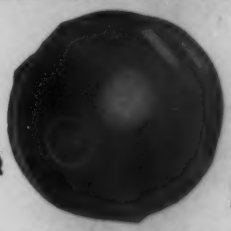
THE APPLE ELECTRIC CO.

NEWARK, N. J.

(All APELCO features are fully covered by patent or patents pending)

MOTOR AND STARTING SWITCH

GENERATOR AND TIMER DISTRIBUTOR



Dreadnought Type

Price $20.00

TRANSIMETER

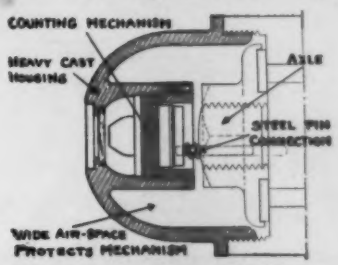
The Advanced Hub Odometer

Easy to Read

Figures always right side up—don't revolve. Grease from axle won't obscure glass window. The figures are always easy to read.

Guaranteed Indestructible

The "Dreadnought" Type shown herewith is guaranteed against injury from collision, etc. The diagram shows why.



The TRANSIMETER makes it easy for you to keep accurate mileage records, operate your trucks in the most efficient manner, and save money.

There are several models, each giving special advantages. The "Applied" Type, for instance, can be fitted directly to the hub-cap of any car or truck.

Write for TRANSIMETER Folder.

RECORDOGRAF

gives complete information about the movements of your truck. It records on a tape:

1. Time truck is moving
2. Time truck is standing
3. Distance truck covers
4. Speed at various times

AGENTS: Accessory and tire salesmen can make a profit on these instruments.

AMERICAN TAXIMETER CO.

Mfrs. of Popp and Jones Taximeters

Seventh Ave. at 49th St. New York City

Service Stations in the following cities:

San Francisco New Orleans Washington Chicago Detroit Philadelphia Seattle St. Louis Boston

Sell This Line of KREBS TRUCKS

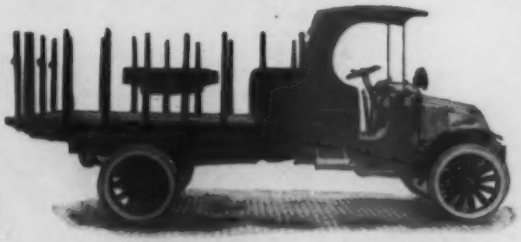
It is an easy and profitable line to sell, because the trucks have

Model E, ½-Ton Truck

Our Remarkable Automatic Governor

Krebs Model G, 1-Ton

Timken-David Brown Worm Drive



Model H, 2-Ton Truck

High-Grade Constructional Units

The Krebs line offers advantages which are not found in any other truck. They are economical, powerful, durable, efficient, and are highly successful wherever used. Let us show you why you should sell the Krebs.

The Krebs Commercial Car Co.
Clyde, Ohio

LAVIGNE

Let Lavigne Steering Gears help sell your trucks.

We are the Steering Gear specialists for the motor trade. Our reputation for quality, durability and superiority is recognized by all. Data Sheets upon request.

GEAR COMPANY

Racine · Lock Box 324 · Wisconsin

The SPEEDOGRAPH Tells

Just What Your Truck Was Doing Every Minute Every Day

Time, Distance and Speed of Every Run
Every Stop and Its Time and Duration
Rate of Speed at any Given Time
Mileage Per Trip, Day or Year

You must have such information to prevent waste and abuse, and to obtain efficient, economic service.

THE SPEEDOGRAPH SAVES

Time — Tires — Gasolene — Repairs — Money

Facsimile of Record
Accurate, Clear and Legible

The tape is divided into hours and minutes, and the record line shows every movement of the vehicle.

Write for catalogue and prices

The Speedograph Sales Corporation *General Distributors* **No. 11 Broadway, New York**

When Writing, Please Say—"Saw Your Ad. in the C C J"

DENBY

Denby trucks are fitted to a business—not tacked on to it.

It takes trained men, with skill and experience in solving haulage problems, to make this adjustment.

Our Traffic Efficiency Department is made up of such men—and their advice is yours for the asking.

That's why every Denby truck in use is the best possible argument for the sale of another.

Denby Motor Truck Co., Detroit

What is more important on an Auto Truck than its BRAKES?

You demand for your truck: power, body room, strength and simplicity in construction. You load it up expecting the engine to walk off with it.

But, how about holding it on a hill or stopping it at a railroad crossing?

When it *must* stop you can depend upon

Thermoid
HYDRAULIC COMPRESSED
Brake Lining - 100%

When you set your brakes lined with Thermoid they take hold noiselessly—they grip—you STOP!

That's because Thermoid is brake lining from top to bottom—just as full of friction or gripping power in the center as on the outside—with 50% more material *in* it and 60% more labor *on* it than any ordinary woven lining.

Thermoid won't burn up on a long, steep, downhill run. Oil, gasoline, water, heat, dirt, won't affect it, and it will outwear any other brake lining, bar none.

Our Guarantee:
Thermoid will make good—or WE will. Specify it on your 1915 truck—order your repair man to put it on your truck in service now.

THERMOID RUBBER COMPANY
TRENTON, NEW JERSEY, U. S. A.

THIS SPACE RESERVED

FOR

G. V. ELECTRIC TRUCKS

BUCKEYE Motor Truck Jacks

Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise of Bar	Height Bar Up	Weight	Capacity	with formed handle	List Price
7	11¼"	6¼"	19"	16 lbs.	2½ tons		$10.00
13	14⅝"	7⅛"	20¼"	26½ "	3 "		15.00
14	14⅝"	7⅛"	20¼"	33 "	5 "		16.00
9	11½"	6"	17½"	10 "	1½ "		6.00

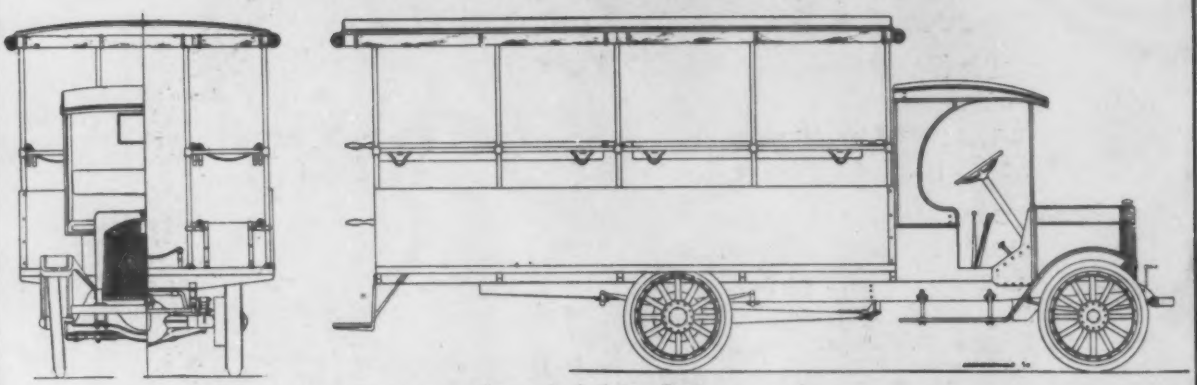
Write today for descriptive catalog. Made only by

THE BUCKEYE JACK MFG. CO., Alliance, Ohio

Highland Standard Bodies

FOR

ARMY SERVICE

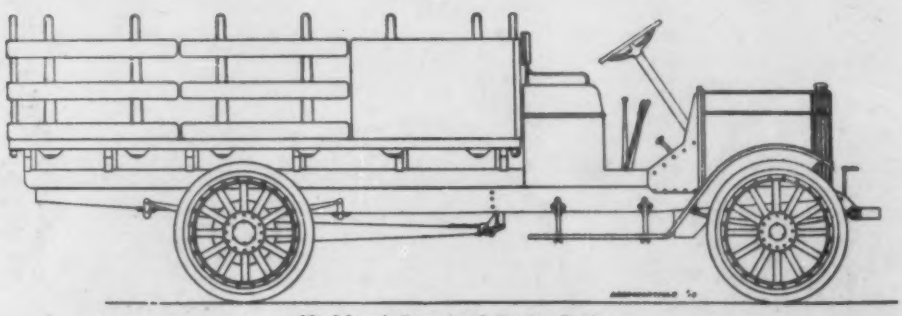


Army Ambulance Body

Ambulance Bodies for Four to Fifteen Stretchers

Army Service Bodies with box or tarpaulin tops

Being specialists on standardized bodies for Motor Trucks, we always carry in stock a large quantity of finished material, so are prepared to make prompt delivery on any quantity of bodies.



Highland Standard Stake Body

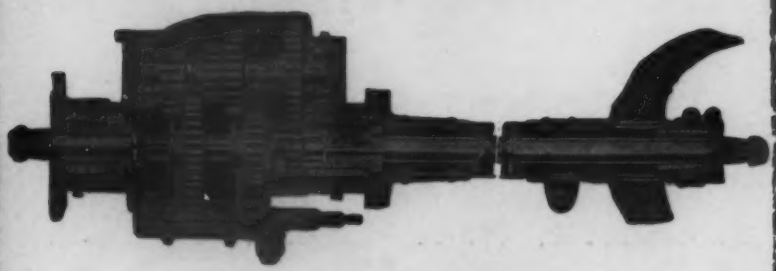
For quotations and delivery, write—

The Highland Body Manufacturing Co.

Cincinnati, Ohio

COVERT

TRANSMISSIONS



COVERT TRANSMISSIONS are the choice of those who make quality the chief consideration. This quality is the result of a specialization in this field, a completeness of equipment and organization, and the creation and maintenance of a standard that is satisfied with nothing less than the best.

The inevitable result has been a product that has taken front rank in efficiency, strength, silence and durability and which is found in ever-increasing quantities in both pleasure cars and trucks of the better class.

We shall be glad to place our knowledge and experience at your command and have our engineers co-operate with you in adapting COVERT TRANSMISSIONS to your product.

COVERT MOTOR VEHICLE CO.

Sales Office: Detroit, Mich.
Factory: Lockport, N. Y.

January 1st 1915

ANNOUNCING

THE BEARINGS COMPANY OF AMERICA

SUCCESSOR TO

J. S. BRETZ COMPANY, NEW YORK
FICHTEL & SACHS, LANCASTER, PA.
STAR BALL RETAINER CO. LANCASTER, PA.

F&S ANNULAR BALL BEARINGS
BALL THRUST BEARINGS
STAR BALL RETAINERS
BOWDEN WIRE MECHANISM
GERMAN STEEL BALLS

Sales Department
250 WEST 54TH STREET
NEW YORK

When Writing, Please Say—"Saw Your Ad. in the C C J"

"Ironclad-Exide"

The Battery for Commercial "Electrics"

"DOING ITS DUTY EVERY DAY"

The "Ironclad-Exide" Battery is in its fifth year of successful service. Its record for the past four years stands as absolute proof of the correctness of its design.

It is unquestionably the battery for commercial service. It is reliable—day-in and day-out—every day in the year. No delays—no fuss—no inconveniences. *Always dependable.*

It is the battery for big loads—rough or hilly roads—*hard service.*

The "Ironclad-Exide Battery hauls the most for the longest time with the least trouble and at the least expense.

It is economical to use and economical to maintain. *It's good when new and it stays good.* It's a business battery for business men.

It is used by the largest electric vehicle users in the country.

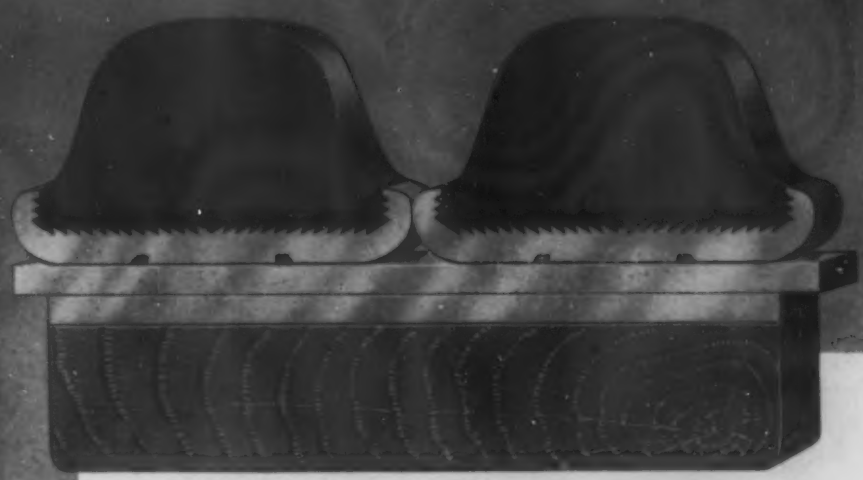
These are our claims for the "Ironclad-Exide" Battery. More convincing, however, is *"what the other fellow says."* Get a copy of the new "Ironclad-Exide" testimonial book. It contains letters from vehicle owners who have used one or more "Ironclad-Exide" Batteries for three years or over.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator", The "Tudor Accumulator"
The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries.

New York Boston Chicago Washington **PHILADELPHIA, PA.** Denver San Francisco Seattle St. Louis
Cleveland Atlanta Pittsburgh Detroit 1888-1915 Rochester Los Angeles Portland, Ore. Toronto
886 "Exide" Distributors 12 "Exide" Depots "Exide" Inspection Corps



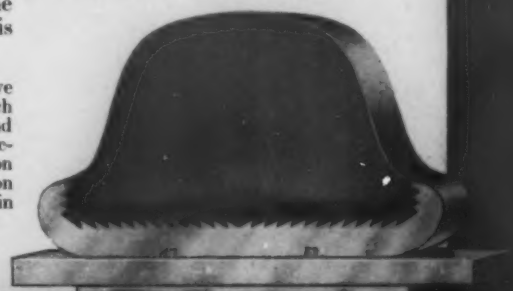
GIBNEY
PRESSED-ON
WIRELESS TIRES

These are the tires which established their supremacy in the truck tire field by making records in everyday service which compelled the admiration and homage of the commercial world.

These performances were but to be expected. They were the logical result of better materials and workmanship and of being the original wireless tires, which ever kept in advance of competition.

These claims of superiority are not empty boastings. We have an abundance of detailed proof from users which compares the mileage and service from Gibney tires with those from other makes, very much to the advantage of the former. This you may have at any time.

The 1915 Gibney Tires have some constructional changes which make them better than ever—and that's saying a lot. The cross sections of the single and dual tires on this page show the new construction which we will be glad to explain in detail.



GIBNEY TIRE & RUBBER CO.
Factory, Conshohocken, Pa.
BRANCHES
Philadelphia, New York, Boston, Detroit, Chicago
AGENCIES
Washington, Baltimore, Wilmington, Harrisburg, St. Louis, Cincinnati, Kansas City, Minneapolis

GIBNEY

DEMOUNTABLE

WIRELESS TIRES

An addition has been made to the Gibney line in the shape of the demountable type shown on this page. Like the pressed-on tires, this type is furnished in single and duals.

These demountable types are the very acme of convenience and ease in their application or removal. Simply unscrew the nuts, remove the side flange and wedge bands and off comes the tire. Application is equally easy.

This type is in great demand in places where there are not convenient facilities for applying pressed-on tires. Anyone can apply them in any place.

We are continually expanding our field of operations and have an exclusive agency proposition that is a real money maker and business builder for an energetic dealer. If you are open to a good truck tire agency and we are not represented in your city, it will be very much to your advantage to get the details of this proposition.

GIBNEY TIRE & RUBBER CO.

Factory, Conshohocken, Pa.

BRANCHES

Philadelphia, New York, Boston, Detroit, Chicago

AGENCIES

Washington, Baltimore, Wilmington, Harrisburg, St. Louis
Cincinnati, Kansas City, Minneapolis

What is the A. B. C.?

(Audit Bureau of Circulations)

THIS is an association—nation-wide in its scope—composed of advertisers, agents and publishers, who have joined together for the purpose of providing machinery to aid in determining the exact circulations which publishers are offering for sale. The membership to date is over nine hundred, and it is constantly increasing as publishers and advertisers realize the advantages of the Audit Bureau of Circulations.

THE publisher-members—of which there are over 700 (over 80 being trade publications)—render quarterly statements of circulation to the Bureau, and agree to an annual audit that the figures given may be substantiated. Copies of these statements, which show both the quantity and the quality of the circulation, are given advertisers and agents on request.

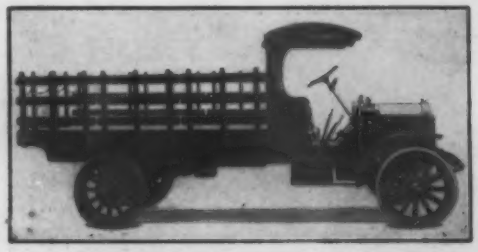
THE only way to buy advertising space is as a commodity. It is simply good business to know that you are actually getting that for which you pay. You would not long continue to buy short weight or measure of any commodity, and you certainly would not have confidence in a man who insisted on your taking his word for the quantity you were buying and refused to have it measured or the quality tested. Buy your advertising space in the same way. Ask the publisher for a copy of his statement to the A. B. C. If he is not a member—there is a reason.

IN operation, the Audit Bureau of Circulations is like the national banking system. The statements required of national banks are accepted because they are subject to verification by the national bank examiners and therefore have the authority of the government back of them. Publishers' statements are accepted by the advertisers because they are subject to verification at any time by the A. B. C. auditors and, therefore, have the authority of the Audit Bureau of Circulations behind them.

WE have particularized to this extent so that *you* would be made familiar with the work of the Audit Bureau of Circulations, and appreciate the significance of the fact that the COMMERCIAL CAR JOURNAL is a charter member, and *is the only truck paper which is a member*. The CCJ has always claimed the largest and best circulation in the motor truck field, and our sworn statement made to the A. B. C., which is subject to annual verification by that organization (copy of which will be sent you on request), substantiates this claim.

WHEN you buy space in the COMMERCIAL CAR JOURNAL you know that you are actually getting that for which you pay.

MR. Russell Whitman, Managing Director of the A. B. C., 330 Railway Exchange Building, Chicago, will gladly supply any advertiser or publisher with full details. Better write him today.



Cass Model "E" 1½ to 2 Ton Capacity. Price, $1850

CASS MOTOR TRUCK

The Cass is of standard construction, built of parts proven by years of widespread service to be the best for their purpose in the motor truck field. Cass trucks are employed in nearly every line of business which can successfully use a truck of this type, and a large share of our business consists of re-orders from satisfied users.

Note the Construction:

Continental Motor, 3¼ x 5½, especially built for truck use and unexcelled for the purpose.
Mea Magneto, high tension, waterproof, the best magneto made. Starts easier than batteries.
Centrifugal Governor, limiting speed to 15 miles per hour and effectively preventing damage from racing.
Sheldon Jack Shaft, semi-floating type.
Sheldon Axles and Brakes, placed on rear wheels, according to U. S. Government specifications.
Brown-Lipe Transmission, sliding gear selective type.
Rear Steering Gear, screw and nut type, strong and exceptionally easy to handle.

Price, chassis with driver's seat only. (Body optional and extra) $1850

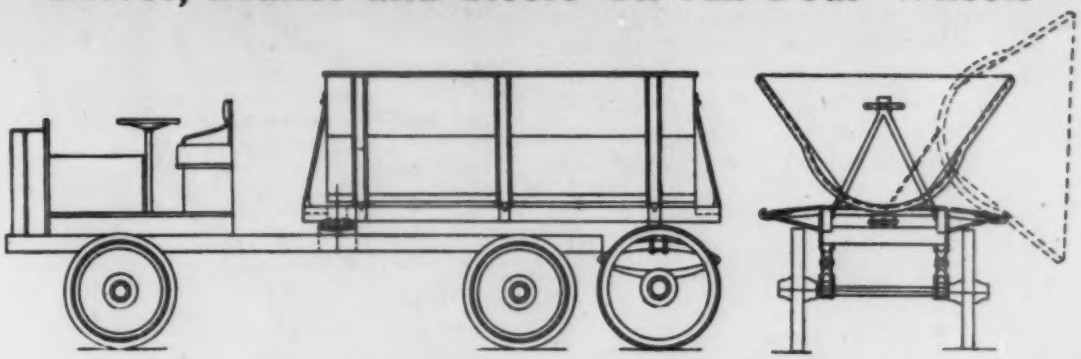
We also build the Independent Model "F" Worm Drive 1500 lb. Truck for $1295

Write for full particulars

INDEPENDENT MOTORS COMPANY - Port Huron, Michigan

The Jeffery Quad

Drives, Brakes and Steers On All Four Wheels



This is the best proposition ever offered to coal, sand, gravel and building material dealers. It is a combination of the famous Jeffery Quad with a Lee patent two-way side-dump body on a semi-trailer. This combination has a capacity of 5 to 7 tons. It has no complicated machinery to get out of order. It is quick in operation. The body can be dumped and returned to loading position in less than a minute. A school boy can operate it. It is exceedingly economical to operate, as two-thirds of the load is carried on the steel-tired wheels of the semi-trailer. It will turn in one-half the space that a rear-drive truck requires. The price is $3,840 f. o. b. Kenosha. This is a 5 to 7 ton dump truck that costs no more than an ordinary 3-ton truck either to purchase or to operate.

This dump-body Quad truck will drive up any alley as long as it can find a holding bottom to get traction. All kinds of hand or power hoists can be furnished, including a three-way dump and an elevating or turntable hoist.

Coal and Building Supply Dealers Need

The Jeffery Quad

Because:

1. It can pull through mud, snow, sand, etc., that will stall any rear-drive truck made. For coal dealers it solves the unpaved alley problem.
2. It is the most remarkable hill-climber.
3. It has very small upkeep expense.
4. It is designed to pull trailers.
5. It has a short turning radius.
6. It has fewer different parts than any other first-class truck.
7. The front and rear wheels track together.
8. It has extraordinary braking capacity.
9. It is practically non-skiddable.
10. It has the endorsement of the United States and foreign governments.
11. It has the remarkable M. & S. locking differentials that automatically put the full power of the motor into any wheel or wheels that can get traction when the others cannot.

Price of Jeffery Quad, 2-ton chassis, $2750 f. o. b. Kenosha. Maximum speed of Quad governed to from 14 to 17 miles an hour. Maximum speed of Quad and semi-trailer, 10 to 12 miles an hour.

Write now for Catalog F-1

The Thomas B. Jeffery Company

Main Office and Works, Kenosha, Wis., U. S. A.

Cable Address "Jeffcar"

Ready Now!

The 1915 Chilton Automobile Directory

$1.00 a Copy

Order your Directory at once

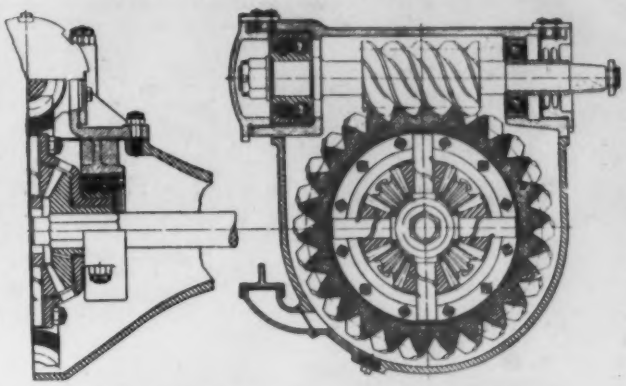
Every Manufacturer, Jobber, Dealer, Engineer and Purchasing Agent needs this "Directory" for daily reference.

It contains the correct name and address of every Manufacturer and National Jobber making or selling anything in the Automobile Industry; also valuable Engineering data, formulae, S. A. E. standards, etc.

Bound with flexible Fabrikoid leather for easy use.

Send us your dollar. The issue will be fully subscribed, and ***you*** need the "Directory" —so don't miss it.

CHILTON COMPANY
Market and 49th Sts. Philadelphia, Pa.



Showing application of New Departure Single and Double Row Ball Bearings in Worm Gear Drive and Differential of Heavy Truck Axle.

NEW DEPARTURE BALL BEARINGS

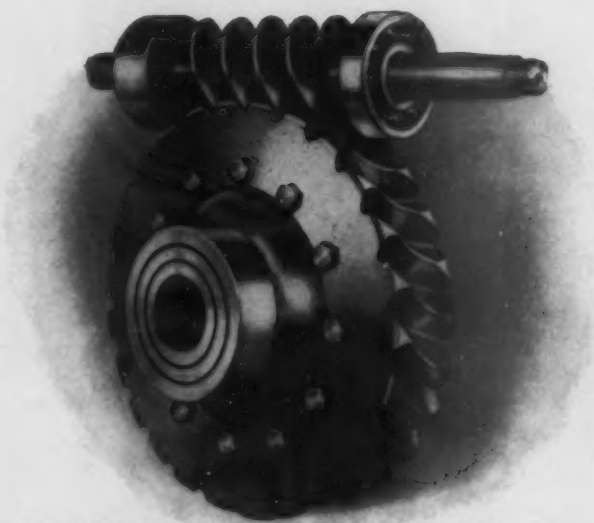
American Made for American Trade

THE success of the worm drive in motor trucks depends largely upon the bearings used.

The worm must be mounted on bearings that will maintain it in absolute alignment with the center line of the worm wheel and at the same time resist adequately the severe end thrust developed in transmitting power.

New Departure Ball Bearings have achieved conspicuous success in motor trucks—not only in worm drive mountings but wherever frictional losses must be reduced to a minimum.

This is the first of a series of ads., illustrative of New Departure Ball Bearings and their application in Motor Truck Building.



The New Departure Mfg. Co.
BRISTOL, CONN., U. S. A.

Distributors in Trade Centers throughout the United States

Western Branch
1016-17 Ford Bldg., Detroit, Mich.

SIGNAL

The SIGNAL Line

Chassis Prices f.o.b. Detroit

One-Ton Chain Drive	*$1400*
One-Ton Worm Drive	*$1500*
One and One-Half Ton Worm Drive	*$1700*

All models furnished in two lengths of wheelbase

This Truck is a Business Builder

This is a mighty important factor to the dealer who is building for permanence. It is more important than immediate profits. A truck may sell because of low price or some fancied advantage only to fall down in the tests of hard usage. The immediate profits are lost in giving free service and repairs while the task of living down the hard feelings and bad reputation is even more costly.

There is no such danger with the SIGNAL. It is a different kind of truck. It is not only built to sell, but is also built to serve. That is important, for a truck that serves faithfully and well is one that creates business for you. Every one on the road is a moving advertisement of SIGNAL quality and efficiency. This is mighty valuable, and the records these trucks make serve to bring new business to your doors. Therefore, a SIGNAL agency means a signal success.

Why is the SIGNAL so successful? First of all—because it is built right. The standard parts used are typical of the construction throughout. Such names as Timken Axles and Bearings, Continental Motor, Covert Transmission, Detroit Springs, Timken-David Brown Worm-Drive Rear Axle, Russel Jack Shaft, Gemmer Steering Gear, Eisemann Magneto, Stromberg Carburetor tell an indisputable story of quality.

Then the capacities—one ton and one and one-half ton—are the easiest to sell. They have the widest application to delivery conditions. The choice of worm or chain drive and two lengths of wheelbase in the one ton, with the worm drive ton and a half, meet practically all requirements.

The SIGNAL sells because its quality and value are readily apparent and its adaptability is the greatest. It builds business because it gives such service that repeat orders and new business are inevitable. The agency for such a truck is profitable now and ***in the future.*** Surely you are sufficiently interested to write us now asking for proof.

Signal Motor Truck Company, Detroit, Michigan

Advertisers' Index

Adams Bros. Co. 79
American Taximeter Co. 101
Apple Electric Co. 100
Autocar Co. 2

Baker Motor Vehicle Co. ... 116
Bearings Co. of America, The 106
Bessemer Motor Truck Co. ... 77
Bowen Mfg. Co. 82
Bowling Green Motor Truck Co. 83
Buchanan Electric Steel Co. . 85
Buckeye Jack Mfg. Co. 103
Buda Co. 75

Candler Radiator Co. 79
Celfor Tool Co. 96
Childs, O. J., Co. 80
Chilton Co. 68, 110, 112
Cleveland Worm & Gear Co. .. 67
Continental Motor Mfg. Co. .. 98
Covert Motor Vehicle Co. 105
Cramp, Wm. & Sons, S. & E. Bldg. Co. 83
Cullman Wheel Co. 75

Denby Motor Truck Co. 103
Durant-Dort Carriage Co. Flint Commercial Car Dept. 95

Edison Storage Battery Co .. 87
Eisemann Magneto Co. 90
Electric Storage Battery Co . 107

Fafnir Bearing Co. 74
Federal Motor Truck Co. 91
Firestone Tire & Rubber Co. . 63

General Motors Truck Co. .. 69
General Vehicle Co., Inc. 103
Gibney Tire & Rubber Co. 108, 109
Goodyear Tire & Rubber Co. 71
Gould Storage Battery Co. .. 73
Gramm-Bernstein Co. 77

Herz & Co. 79
Highland Body Mfg. Co. 104

Independent Motors Co. 110
International Harvester Co., of America 78
International Motor Co. 88

Jeffery, Thomas B., Co. 111
Johns-Manville, H. W., Co .. 81

Krebs Commercial Car Co. .. 101

Lavigne Gear Co. 102
Lippard-Stewart Motor Car Co. 99
Long Mfg. Co. 84

McGraw Tire & Rubber Co. 77
McQuay-Norris Mfg. Co. 97

Never-Skid Mfg. Co. 83
New Departure Mfg. Co. 113

Packard Electric Co. 94
Packard Motor Car Co. 84
Parish & Bingham Co. 83
Pierce-Arrow Motor Car Co. . 80
Pierce Speed Controller Co. .. 115
Polack Tyre & Rubber Co Back Cover
Poyer, D. F., Co. Inside Back Cover
Pyrene Mfg. Co. 81

Republic Motor Truck Co. Front Cover
Ross Gear & Tool Co. 84
Rowe Motor Mfg. Co. 82
Russel Motor Axle Co. 86
Rutenber Motor Co. 82
Ryerson, Jos. T., & Son 78

Schwarz Wheel Co 93
Selden Truck Sales Co. 79
Sheldon Axle & Spring Co. .. 70
Signal Motor Truck Co. 114
Speedograph Sales Corp. 102
Spicer Mfg. Co. 78
Splitdorf Electrical Co. 72
Stegeman Motor Car Co. 81
Stewart Motor Corporation .. 89
Sullivan Motor Truck Co. ... 92

Thermoid Rubber Co. 103
Torbensen Gear & Axle Co. Inside Front Cover
Touraine Co. 84

United States Motor Truck Co. 82
United States Tire Co. 80

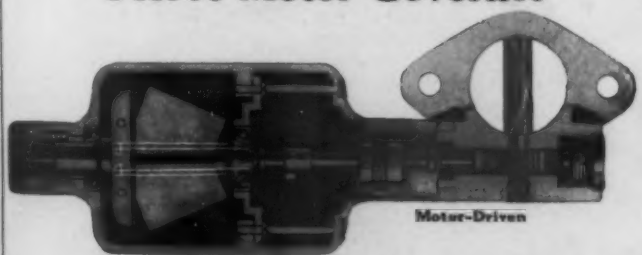
Van Dorn & Dutton Co. 78
Veeder Mfg. Co. 74
Velie Motor Vehicle Co. 80

Walker Vehicle Co. 76
Warner Gear Co. 73
Waukesha Motor Co. 77
West Steel Casting Co. 81
White Co. 65
Wisconsin Motor Mfg. Co. .. 76

"FAMOUS PIERCE PRODUCTS"

Adopted, used and endorsed by the leading makers and users of trucks and motors all over the country

Pierce Motor Governor



Motor-Driven

This standard device is used on over 100 makes of trucks and motors, including the following makes of the latter: Continental, Rutenber, Buda, Hazard, Waukesha and Wisconsin. It is motor-driven and can be attached to any exposed rotating part of the motor and is adjustable to any desired number of revolutions per minute.

Write for Details

Pierce Speed Controller

This is operated from the front wheel and leaves the motor free under any and all conditions. It increases efficiency and durability, promotes safety and economy, eliminates abuse, overspeeding, and most liability of accidents. Used by hundreds of prominent concerns, because it affords the best possible protection for their trucks.

Send for Booklet

PIERCE SPEED CONTROLLER COMPANY, ANDERSON, INDIANA

Baker Electric Trucks

Baker Electric
5 Ton Truck

For heavy duty on city streets where stops are numerous this Baker model has no equal. Here are ten of the many desirable features that characterize Baker Trucks:

1. *Low seat construction.*
2. *Controller operated from the steering post.*
3. *Easy acting steering mechanism.*
4. *Two sets of powerful double brakes.*
5. *Heavy pressed steel channel frame.*
6. *Hardened and ground pins and bronze bushings.*
7. *Every important bearing surface lubricated.*
8. *Large capacity battery—any high grade make.*
9. *Maximum speed and mileage.*
10. *Exceptionally long life and low operating cost.*

We are prepared to make early delivery on trucks of any body type in 1 ton, 2 ton, 3½ ton and 5 ton capacities. We can show you point for point why Baker Trucks cost a little more to begin with and a whole lot less in the end. A letter from you will bring this information.

The Baker Motor Vehicle Co., Cleveland

Here Are Good Reasons Why You Should Sell

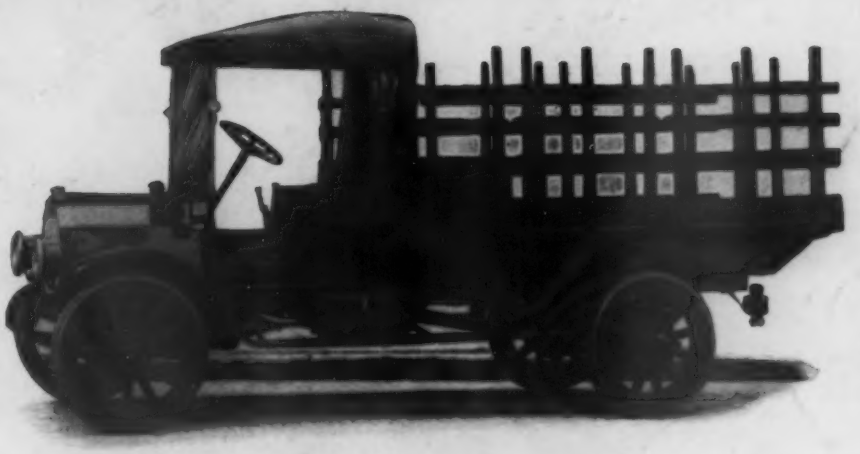
The MENOMINEE MOTOR TRUCKS

Chassis Prices

MODEL A-3
capacity 1500 lbs.
$1125

MODEL B-3
capacity 2000 lbs.
[$1400

MODEL C
capacity 3000 lbs.
$1800



If you are desirous of taking on a motor truck line or are not satisfied with the one you now handle, the **Menominee** will appeal to you with great force because there are sound logical reasons why a prospect should buy a Menominee.

First of all, it meets the demand of the prospective purchaser that the truck he buys be of proven worth; that its design and construction have been thoroughly tested in usage and found correct.

Second, the producing company is financially strong, with a fine record of success and is in business to stay. There will be no trouble in getting parts or service or the making good of guarantees, if such ever becomes necessary.

Third, its specifications compare favorably with other makes of similar capacity and the prices at which it is sold are low for such quality.

Fourth, it has been on the market so long, been so widely used and proven so successful in service that there can be absolutely no question as to its ability to do the work for which it is designed.

Fifth, the capacities are those which are most efficient and economical in the average delivery service and consequently are the most popular and best selling sizes.

Sixth, our advertising campaign, selling plan, business methods and the great volume of strong, convincing letters from users, with which we supply you, all help you to convince prospects that the **Menominee** is the truck to buy.

These are some of the reasons why the **Menominee** is a good-selling truck and a money maker for the dealer. We have some territory open and will be glad to take up our agency proposition with you. Please write us about it promptly.

D. F. Poyer Company - Menominee, Mich.

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